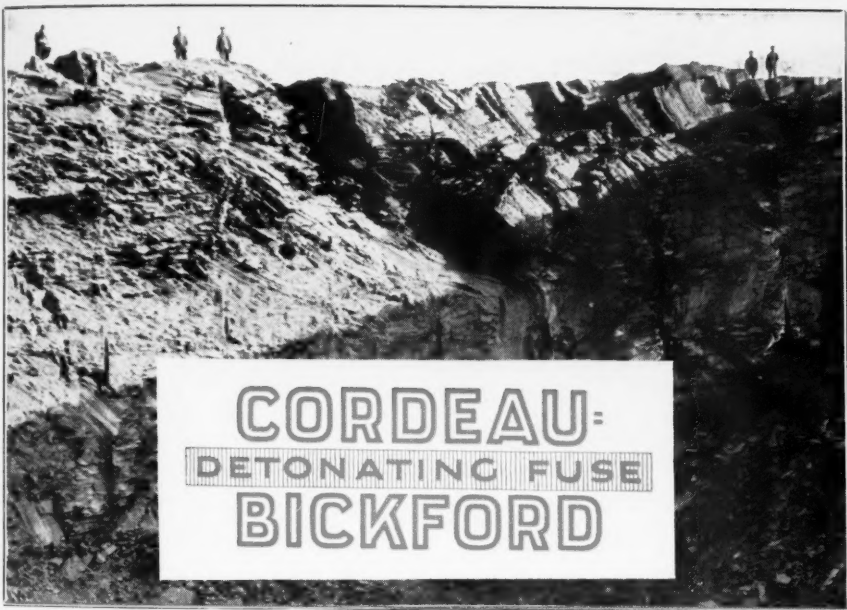


Pit and Quarry

SAND-GRAVEL-STONE
CEMENT-LIME-GYPSUM



CORDEAU-
DETONATING FUSE
BICKFORD

*will help you in safe, sure and
efficient blasting in your quarry*

Write for Booklet Today

The Ensign-Bickford Company
Simsbury, Conn.

March 15, 1926

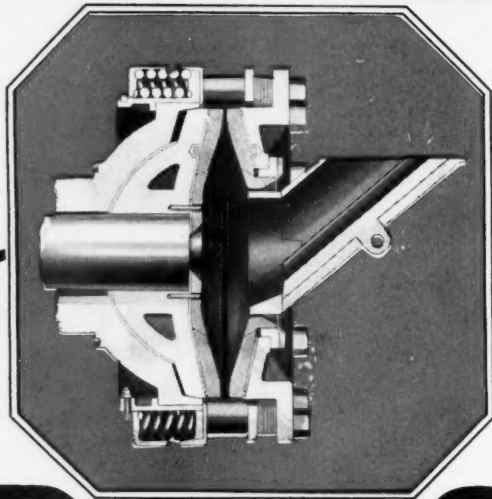
Index to Advertisers ----- Page 49

Table of Contents ----- Page 51

Circulation 7,500

INTERCHANGEABLE

One with another — either side — less waste metal.



Standardized — and fully interchangeable.

DISCS

The *fully interchangeable* feature of Symons Discs eliminates the necessity of carrying excess disc part stocks — and facilitates the ease of re-ordering.

It has *always* been a known fact that Symons Discs give unusual long wear — they wear even and true to the very last — and when worn out represent *less scrap metal*.

And — now with their *new interchangeability* the scrap loss is even less, making them by far the *cheapest* in operating cost.

These new discs can be easily fitted to any style disc crusher now in operation — write for details

SYMONS BROTHERS CO. ORE, ROCK AND GRAVEL CRUSHERS

RAILWAY EXCHANGE BUILDING
LOS ANGELES OFFICE
1462 STANLEY AVENUE
HOLLYWOOD

MILWAUKEE, WIS.
NEW YORK OFFICE
51-EAST 42 ST.
NEW YORK CITY

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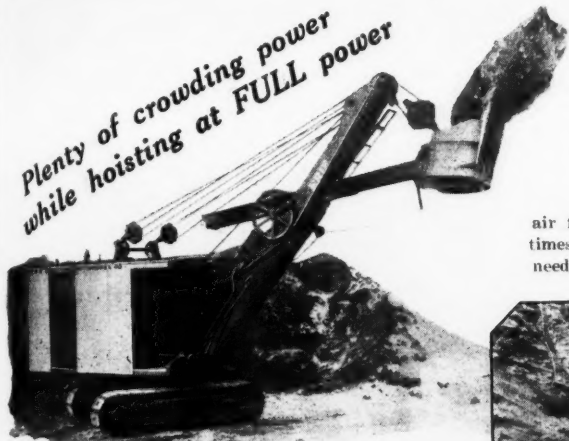
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Plenty of crowding power
while hoisting at FULL power



Everywhere the owners of Gas+Air ERIES are reporting that this shovel gives the results of a steam shovel in hard digging.

Here's another of the reports that have been coming in:

"The Gas+Air ERIE has been 100% satisfactory and my foreman and operator are both very well pleased with the machine and its work. It is now digging in a red shale formation and can dig all the material that a steam machine will handle. I have watched my operator dig, swing and dump four 1 1/4-yd. bucketfuls per minute.

"We are now working five miles from a railroad where the road is impassible for trucks to haul coal and water. We have only one operator and a ground man looking after the Gas+Air ERIE.

"I had owned several ERIE steam machines and was satisfied that the ERIE gasoline shovel would be right. Now I have another Gas+Air ERIE ordered."— D. L. Dennis, Smethport, Pa.

When your work is in a gas shovel location, get steam shovel results

You don't have to sacrifice digging ability or speed in order to use a gas machine.

This fact has been proved by the records of contractors all over the country. Their work has shown that the Gas+Air ERIE has a steam shovel's speed and power—

And the simplicity and reliability of a steam ERIE.

The Gas + Air ERIE'S crowding action is positive — an independent set of direct-connected air engines does the work.

No power whatever is stolen from the hoist. The big gasoline engine, which is direct-connected for hoisting, only compresses air for crowding and swinging at times when its full power is not needed for hoisting or traveling.



Hard shale digging without blasting—and the ERIES work right along giving reliable service every day. Service like this that has made ERIES—

The largest selling revolving shovels and cranes—because the most reliable.

More than 3700 ERIES now in service. This unique experience in shovel building is your assurance of a sound machine.

No radical changes have ever marked the ERIE'S development—just a constant improvement in a machine that was always basically right.

Have you seen the B-2 ERIE Dreadnaught?" Handles a 1 yd. dipper and stands up to it splendidly— but is as compact as many 3/4 cu. yd. machines.

You will size it up as the finest steam shovel you have ever seen— write for description.

ERIE STEAM SHOVEL CO., Erie, Pa., U. S. A.

Builders of ERIE Shovels, Cranes, Ditchers, Draglines, Trench Hoes, etc.

Branch Offices: Boston, New York, Philadelphia, Pittsburgh, Atlanta, Chicago
Representatives throughout the U. S. A.

ERIE

GAS + AIR

Shovel
and Crane

Fully
protected
by basic
patents

Gas and Air ERIES are equipped with 100 H. P. WAUKESHA Engines



WAUKESHA Engines on ERIE

For years "ERIE" has meant "reliable shovel" to contractors....more than 3,700 in service. For twenty years, WAUKESHA has signified reliable and economical heavy duty gasoline engines. Is it any wonder that Mr. McMichael, owner of the above shovel, writes: "Want to tell you how well pleased we are.....It has come up to our expectations in every way. This shovel is turning out an average of 796 yards a day....low cost of operation is another valuable point."

From coast to coast and from lakes to gulf, similar reports come to us not only from Eries but from users of our engines in 32 different kinds of industries. Write for "Industrial Applications," a book describing uses for our motors.

WAUKESHA MOTOR COMPANY

Waukesha Wisconsin

New York Kansas City Denver Tulsa Houston
 Aeolian Building V. L. Phillips Co. Wilson Machy. Co. C. F. Camp Co. Portable Rotary Rig Co.

Exclusive Builders of Heavy Duty Gasoline Engines for Nearly Twenty Years

KOEHRING

Gasoline Crane

Crane Capacities

No. 1—1 cu. yd. clamshell bucket on 40 ft. boom or $\frac{3}{4}$ cu. yd. on 45 ft. boom. Lifting capacity, 10 tons at 12 ft. radius. Four cylinder, 5x6 in. gasoline engine, 1100 R. P. M.

No. 2— $1\frac{1}{4}$ cu. yd. clamshell bucket on 45 ft. boom or 1 cu. yd. on 50 ft. boom. Lifting capacity, 15 tons at 12 ft. radius. Four cylinder, 6x7 in. gasoline engine, 925 R. P. M.

THE spring steel clutch and brake bands and the special die-moulded Koehring specification asbestos black friction linings cost more and are an indication of the Koehring regard for greater service detail. The Koehring is built to service requirements and not to a price.

Koehring *Finger-Tip Control* made possible by self-equalizing double outside band friction clutches of great size—Koehring high speed responsiveness due to strictly internal combustion engine design in every detail—Koehring *Heavy Duty Construction*—all combine in a crane of unusual extra yardage and extra profit possibilities. Know the Koehring before you buy.

Send for Crane Bulletin No. CR-32

KOEHRING COMPANY

PAVERS, MIXERS—GASOLINE SHOVELS, CRANES AND DRAGLINES

MILWAUKEE, WISCONSIN

Sales Offices and Service Warehouses in all principal cities

Foreign Dept., Room 1370, 50 Church St., N. Y.

Canada, Koehring Company of Canada, Ltd.

105 Front Street, East, Toronto, Ontario.

Mexico, F. S. Lapum, Cinco De

Mayo 21, Mexico, D. F.



A 3171-III-IV



BROOKVILLE

CASOLINE LOCOMOTIVES



Entire Satisfaction!

Clifton Forge, Va., January 18, 1926.

Brookville Truck & Tractor Co.,
Brookville, Pa.

Gentlemen:

Sometime ago when we were in the market for a Gasoline Locomotive, we consulted a friend, who is one of the largest contractors in America, as to what we should buy for our requirements. He, without hesitation, recommended the Brookville for the reason that he had used the Brookville and knew it would give us satisfaction.

We purchased a Brookville Gasoline Locomotive, have been using it for several months, and we are pleased to state that it has given us entire satisfaction.

Our Quarry, where the locomotive is used, is at Waynesboro, Virginia, and it would be a pleasure to demonstrate this Locomotive to any prospective customers in this section of the state.

Yours very truly,

MATHEWS-CURTIS COMPANY,
(Signed) Eugene Mathews, President.

Brookville Truck & Tractor Co.
Brookville, Pa.



Two of a Kind— Both of Them Aces

Much of our business is the furnishing of locomotives to old customers. Many quarries have standardized on "Whitcombs" because they appreciate the many advantages that are exclusively "Whitcomb." Short overhang—low center of gravity—high track clearance—all this means no derailment of cars or locomotives.

Again "Whitcombs" have more horse-power per ton of weight, 10 to 16 horse-power being provided. Cabs are designed with a view to comfort and safety to operators—clear vision—all levers conveniently placed—all moving parts enclosed.

Ask your locomotive operator about "Whitcombs"—let us send you complete data on any type, size or gauge—this service is gratis.

Geo. D. Whitcomb Company

Rochelle

Illinois

Offices in principal cities

GASOLINE - STORAGE BATTERY - ELECTRIC
WHITCOMB
 LOCOMOTIVES

The **MODERN**  **MASSILLON**
 Steam — **3/4-7/8** — Shovel
 RANGE



Gives the Steady Service that Yields Steady Profit

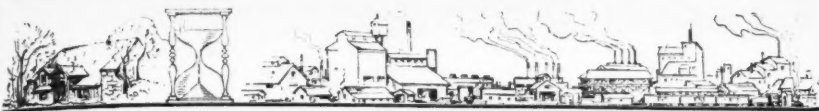
Its performance is dependably consistent because it is powerfully built and simply designed on sound engineering principles. It is accessible and versatile under the most difficult conditions.

These features of the Modern Massillon will increase your daily output, reduce digging costs and increase your margin of profit.

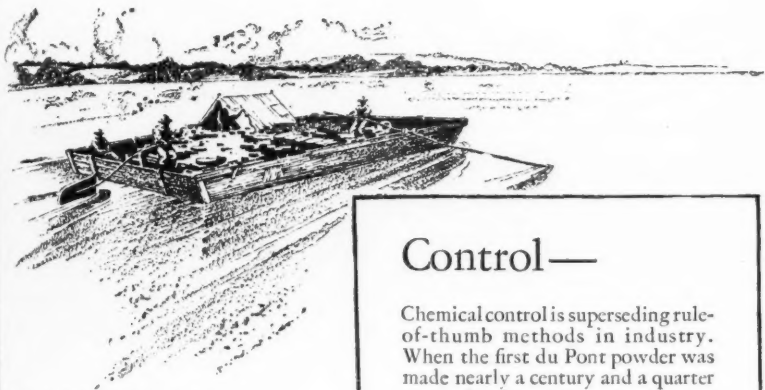
THE RUSSELL & CO.

B U I L D E R S

MASSILLON, OHIO



MAKERS OF POWDERS SINCE 1802



In 1802 the flatboat carried du Pont powder to settlers along the Ohio.

Control—

Chemical control is superseding rule-of-thumb methods in industry. When the first du Pont powder was made nearly a century and a quarter ago—chemistry was not an exact science.

Today, the chemical engineer with the vast resources of modern science at his disposal controls production from raw material to finished product.

To chemical control, through research and experiment, is due that unvarying quality which makes the "Du Pont Oval" a standard of excellence everywhere.

E. I. du Pont de Nemours & Co., Inc.

Explosives Department

Wilmington, Delaware



Today, du Pont high explosives used in deepening river channels contribute to the safety of navigation on our great inland waterways.

123 YEARS OF LEADERSHIP IN THE SERVICE OF INDUSTRY

Greater POWER
and ENDURANCE in
GMC
Big Brute

WATCH Big Brute pull a heavy load up a steep hill—watch it plow its way through “heavy going”. Then you will realize its *greater power*. You can load it to full capacity—and *more*—knowing it is powerful enough to master the toughest job a truck is ever up against.

And Big Brute is strong and sturdy enough to stand up under the greatest stress. GMC products have always been remarkable for their endurance. More than *71% of all vehicles ever built by General Motors are still in active service*. And into Big Brute has been built even greater endurance—**endurance** such as trucks have never had before.



POWER

and **ENDURANCE** such as trucks have never had before made possible by these features

53 Horsepower Engine

An engine powerful enough to master any job a truck is ever up against.

2 Range Transmission

Two separate pairs of constant mesh gears give the countershaft two separate speeds. By merely shifting the range lever (which is easily accessible from the driver's seat) the power can be transmitted either through the low super-power range for "heavy going", or through the high driving range for usual requirements.

This two-range transmission—an exclusive GMC feature—develops 30 per cent more pulling power than is possible with the same size engine and the usual type of transmission.

This two-range transmission is also an economy feature. It makes it unnecessary to "over-power" the truck, and provides a power transmitting unit which assures **economical operation under any and all conditions.**

Pressed Steel Frames

The sturdy heat-treated pressed steel frame, with its six cross members and rear end diagonal braces mean greater semi-flexibility and endurance.

Radius Rods

—relieve the springs of all stress except carrying the load, the driving thrust from the rear wheels being delivered through the radius rods direct to the frame. The radius rods also assure perfect alignment of the rear axle.

Simpler, Stronger Axles

—built with fewer working parts and great over-strength—the rear axle being a full floating, worm-gear type.

Products of

Yellow Truck and Coach Manufacturing Company

subsidiary of General Motors

GMC Big Brute, 3½ and 5 ton trucks

GMC 1, 1½ and 2½ ton trucks

Yellow Cabs - Yellow Light Delivery Trucks

Yellow Coaches - Hertz Driveurself Cars

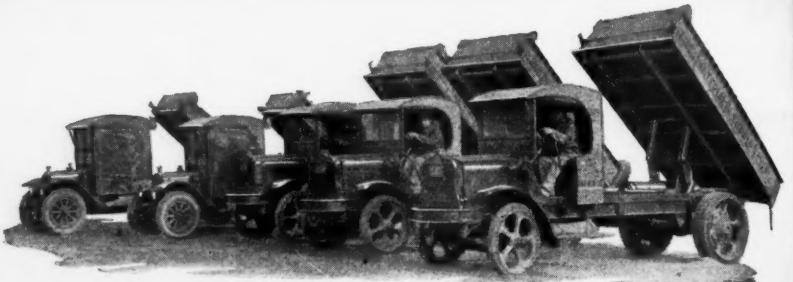
GMC 5 to 15 ton Tractors

A General Motors Product

Sold and Serviced Everywhere by Branches, Distributors and Dealers of

GENERAL MOTORS TRUCK COMPANY, PONTIAC, MICHIGAN

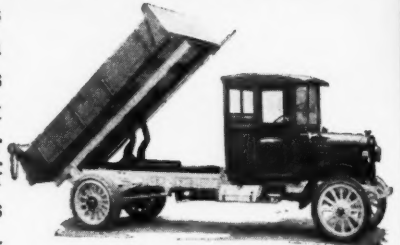
A DIVISION OF YELLOW TRUCK AND COACH MANUFACTURING COMPANY



The St. Louis Material and Supply Company, St. Louis, Mo., operates this fleet of five White Trucks, all St. Paul Hydraulic Hoist equipped, of course!

Fourteen Years Old March Third

St. Paul Hydraulic Hoists are fourteen years old March the Third. That day marks the installation of the first Hydraulic Hoist built for Commercial purposes. Of course, they were in process of development months before.



A. Heavy Duty St. Paul Underbody Hoist installation on an Armleder Truck.

The First St. Paul Hoist Is Still in Daily Service

This fourteen years of Hoist experience is back of every St. Paul Hoist and is a guarantee of quality and long service.

The Proof of Service Is Time

HYDRAULIC HOIST MANUFACTURING CO.

FACTORIES AT ST. PAUL, MINNESOTA

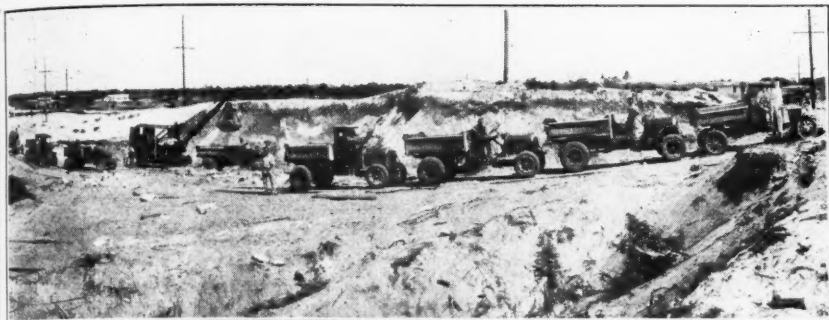
DISTRIBUTORS and SERVICE STATIONS Everywhere

Write for Name and Address of One Nearest You

— **St. Paul** —
VERTICAL AND UNDERBODY
HYDRAULIC HOISTS

United MOTOR TRUCKS

IN ROAD CONTRACT SERVICE



A fleet of United "Constructors" in Florida.

The test of actual use under the hardest conditions has proven the worth of the United "Constructor." Owners of United fleets are unanimous in their praise of the performance, dependability and low operating costs of these trucks.

The benefits of fifteen years' experi-

ence exclusively devoted to quality truck building is incorporated in every United.

The United "Constructor" is made in two models, the 30-D and the 25-D. Priced exceptionally low either model spells economy to the user. For instance, the 25-D is \$1750.00 at the factory.

United Motors Products Company

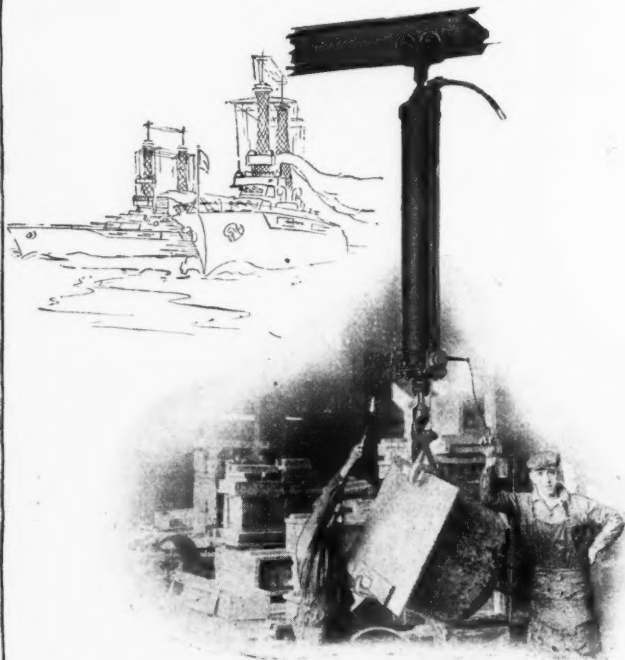
Grand Rapids, Michigan



"QUALITY TRANSPORTATION UNITS SINCE 1910"

CURTIS

1854 - Seventy two years - 1926



As effective as hydraulic power for speed control

Hydraulic power is no longer essential to get exact speed control. A Curtis Balanced Pressure Air Hoist with cushions and speed boxes regulates hoisting

and lowering to fractions of an inch—jerk the valve wide open, the Curtis hoist will hoist or lower glass, explosives, breakables, anything, without a tremor.

During the World War, ammunition hoisting to the turrets on the great battleships Oklahoma and Nevada was accomplished by Curtis Balanced Air Hoists.

Mail this coupon for free illustrated literature.

Curtis Pneumatic Machinery Co., 1628 Kienlen Ave., St. Louis, Mo.
Branch Offices: 631-K Hudson Terminal, New York City

Gentlemen—Please send me your proposition and prices on Model "A" Compressor, Hoists and Cranes.

Name Address

Jobber's Name Address



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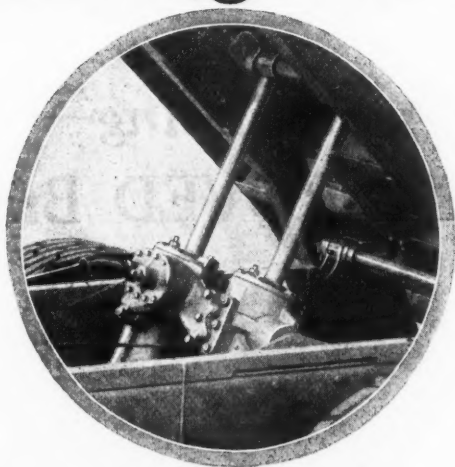
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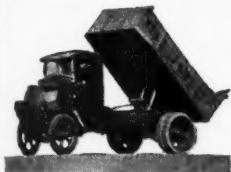
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HEIL QUALITY 25th ANNIVERSARY



New Heil Dump Features



The new Model 26 Heil Hoist is still the same old reliable twin-cylinder unit—but it has been improved to give even more and better service. The oil reservoir is now located in the top of the cylinders thus eliminating the tank. A longer piston stroke increases the dumping angle and ground clearance. The weight and oil capacity of the new hoist models have been considerably reduced.

The improved Heil Hoist is announced at a most appropriate time. It is just twenty-five years ago that The Heil Co. was founded.

— H —

During all that time the trade mark of Heil Quality has increased in its influence until today it is the buying standard of the dumping equipment field.

— H —

The Heil Co. manufactures a complete line of steel Dump Bodies, Hydro Hoists, Mechanical Hoists, Hand Hoists, Gravity Dumps and Compartment Truck Tanks for all motor trucks.

— H —

Heil Hoists and Bodies for dump trucks are easiest to mount and operate. Send for Bulletin 152 which shows Heil Dumps on fifteen different trucks.

THE HEIL CO.

1139-75 Montana Ave., Milwaukee, Wisc.

One of our Twenty-Five Distributors is Near You
MFRS. STEEL DUMP BODIES, HOISTS AND TANKS FOR MOTOR TRUCKS

The Heil Co.,

1139-75 Montana Ave., Milwaukee, Wis.

Please send your Catalog on Heil Bodies and Hoists to

Name

Address

City

PULVERIZERS

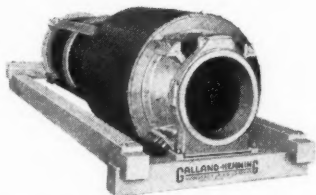
Announcing—
**The IMPROVED Bradley
Hercules Mill**



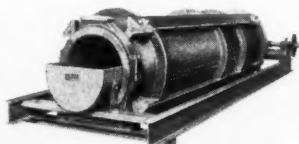
The **LATEST** word in pulverizing machinery. Ask us about the many design improvements made to this wonderful preliminary pulverizer. Every cement and agricultural limestone producer should be interested.

BRADLEY PULVERIZER COMPANY*BOSTON* Works: ALLENTOWN, PA. *LONDON*

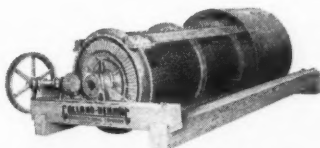
Just A Few Installations Rollerless Rotary Screen



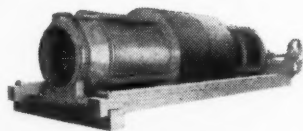
Feed end with Spout removed—60" dia. 16 ft. long Screen
Equipped with Dust Jacket
Grand Rapids Gravel Co., Grand Rapids, Mich.



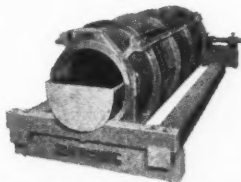
Feed end with Spout in place—48" dia. 14
ft. long Screen with Scrubber section and
Steel Frame.
Annville Stone Co., Lebanon, Pa.



Discharge end showing Drive
48" dia. 14 ft. long Screen with Dust Jacket
Limestone Quarries, Delphos, Ohio



Washing screen with Scrubber and Sand
Jacket—60" dia., 20 ft. long
Grand Rapids Gravel Co., Grand Rapids
Mich.

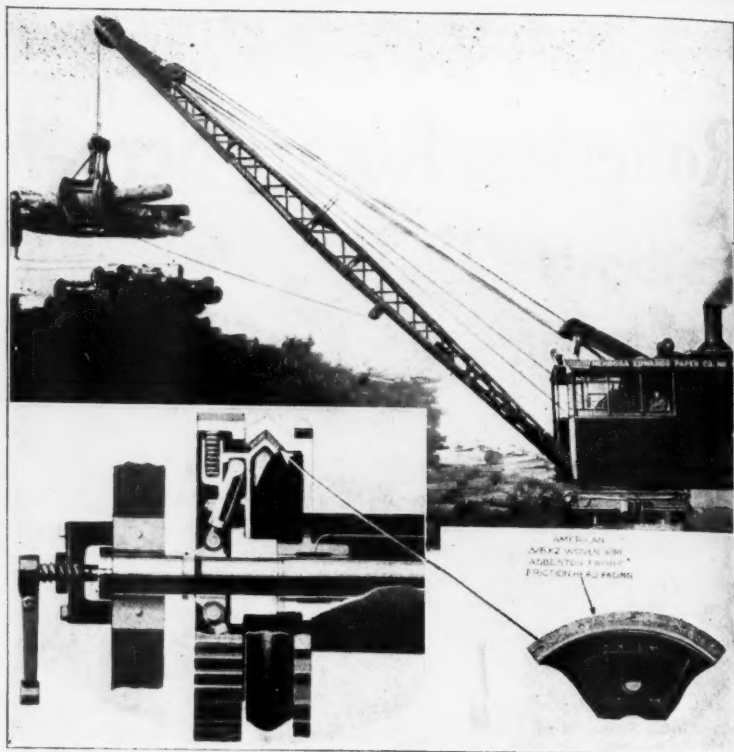


Plain Sizing Screen—60" dia., 12 ft. long
United States Gypsum Co., Southard, Okla.

A MIGHTY RUGGED SCREEN

GALLAND-HENNING
MANUFACTURING COMPANY
MILWAUKEE — U. S. A.

Ask
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ould



**ONE OF THE REASONS WHY
"AMERICAN" Locomotive Cranes
WORK SMOOTHER, LAST LONGER**

Much of the smooth operation of "AMERICAN" Locomotive Cranes is due to the "AMERICAN" Large Diameter, Cool Running Expansive Friction Clutches. So smooth and gradual is the grip of these clutches that the slip ring used to cushion shocks to the gearing on some cranes using old type positive clutches is not needed on "AMERICAN" Locomotive Cranes. Clutches expand outward into the friction groove of the drum. The heads travel only a fraction of an inch to make contact. Heads are faced with non-burning, non-swelling asbestos fabric.



AMERICAN
HOIST & DERRICK CO.



Saint Paul, Minn.

New York, Chicago, Pittsburgh, Seattle, St. Louis, New Orleans



This P & H $\frac{3}{4}$ yd. Gasoline Shovel was operated in the stone and clay pit at the plant of the Clydesdale Brick and Stone Co., Ellwood City, Pa. Height of cut was 30'0".

Ease of Handling Demonstrated

R. S. Martin & Son were confronted with the job of stripping a stone and clay pit where the overburden was very hard.

A P & H $\frac{3}{4}$ -yard shovel more than fulfilled expectations as shown by the fact the average output was 300 yards per 9-hour day. The fact that this was the first shovel ever run by the operator, Herbert Martin, demonstrated its easy handling—especially in view of the fact that the stripping of 16,000 yards from this pit, consisting of 3 feet of very hard fine clay, a vein of cannel coal, hard shale and yellow clay overburden,—was done with the temperature almost constantly around zero.

Write for Bulletin 82-X

HARNISCHFEGER CORPORATION

Successor to PAWLING & HARNISCHFEGER CO.

Established 1884

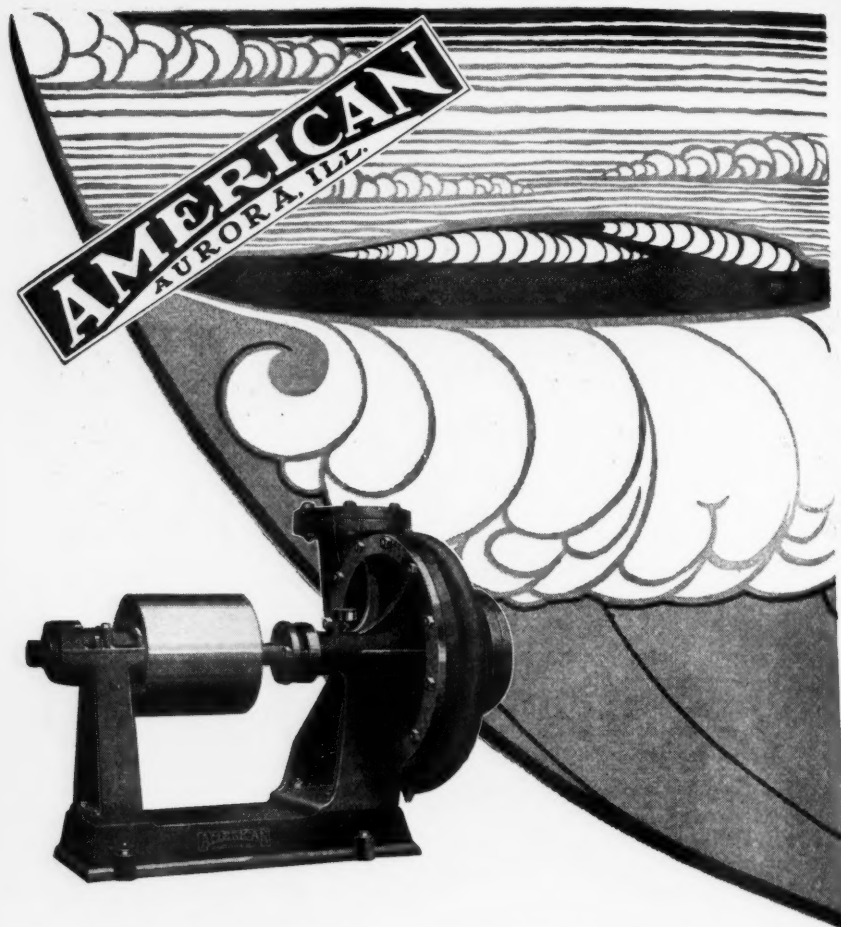
3851 National Avenue

Milwaukee, Wis.

Offices and Agents in Principal Cities.
Warehouses and Service Stations: Philadelphia, Memphis, Jacksonville, San Francisco,
Los Angeles, Seattle



SHOVELS
Gasoline - Diesel - Electric



Naturally, there are a good many local conditions that affect the choice of a pump, but there must be some reason why so many engineers insist that no matter what the **type** of centrifugal used—it must bear the name plate of The American Well Works.

THE AMERICAN WELL WORKS

General Office and Works—Aurora, Illinois

BRANCH OFFICES:

Chicago, Ill., First National Bank Bldg.
 Milwaukee, Wisc., Wisconsin National Bank Bldg.
 New York, N. Y., 165 Broadway
 Dallas, Texas, Western Indemnity Bldg.
 San Francisco, Calif., 635 Mission St.

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Philadelphia, Pa.	St. Paul, Minn.	Joplin, Mo.	New Orleans, La.	Phoenix, Ariz.
Pittsburgh, Pa.	Omaha, Nebr.	Atlanta, Ga.	Roswell, N. Mex.	Los Angeles, Calif.
Cleveland, Ohio	St. Louis, Mo.	Birmingham, Ala.	Denver, Colo.	Charlotte, N. C.
Detroit, Mich.	Kansas City, Mo.	Jacksonville, Fla.	Salt Lake City, Utah	Calgary, Alta., Can.
				Edmonton, Alta., Can.

HERC

HERCULES ON THE JOB

In Shovels and Diggers

Every morning the switches of the thousands of Hercules Engines in general industry are turned on;

and the Hercules Engines and Power Units deliver faithfully until the switches are turned off.

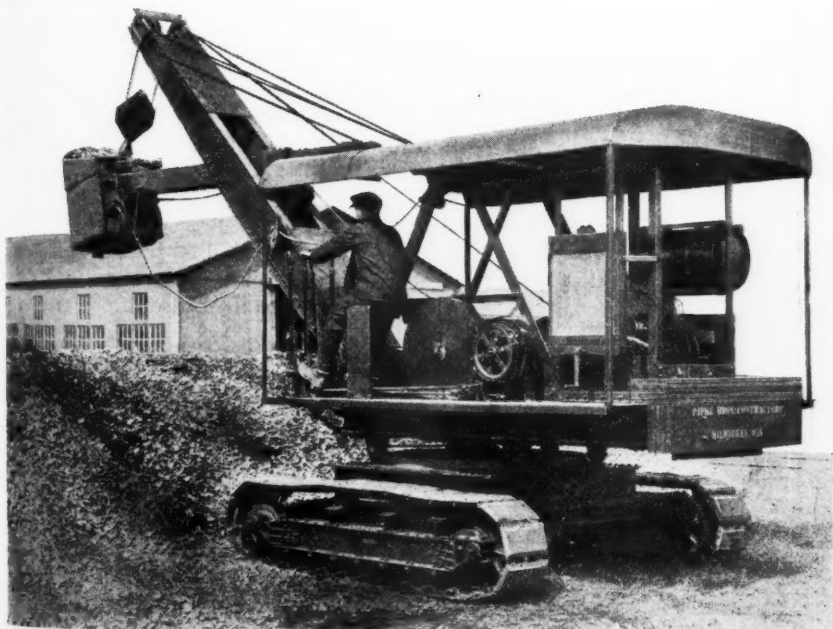
It is this steadfastness of power delivery—this keeping on the job—that has earned for Hercules Engines their enviable reputation for faithfulness of performance.

The engine is too important a part of the machine to risk an experiment. With Hercules—a proven engine—your crane, your shovel, your locomotive, will get on the job, and will stay on the job.

Hercules Engines are power!

HERCULES MOTORS CORPORATION, CANTON, O., U S. A.

HERCULES
[GREATEST SIMPLICITY OF DESIGN]
ENGINES
{FROM 20 HP TO 100 HP}



Ask any of
these users—
they know!

12 big users
of the
Vulcan Kiln

Alpha Portland Cement Co.
Canada Cement Co.
Dexter Portland Cement
Co.
Lawrence Portland Cement
Co.
Lehigh Portland Cement
Co.
Marquette Cement Mfg. Co.
Pacific Portland Cement
Co.
Phoenix Portland Cement
Co.
Sandusky Cement Co.
Southwestern Portland Ce-
ment Co.
Whitehall Cement Mfg. Co.
General Chemical Co.

Vulcan Products

Hoists,
Electric and Steam
Locomotives,
Shots, Gasoline, Electric
Rotary Kilns, Dryers, Coolers and
Roasters
Ball Mill
Ball Mill
Mine Ventilating Fans
Gages and Scales
Shovel Wheels
Curtis Engines
Coal Chutes
Gray Iron Castings
Open, Flange Steel Castings
Cherry Moulded and Cut Teeth
Special Machinery



From these 12 users
of the Rotary—

337 Repeat Orders

This figure—a total of 337 repeat orders—from 12 users of the Vulcan Rotary Kiln for cement making is significant.

Add 12 to this figure and you get the total number purchased by these cement manufacturers. The greatest number purchased by any one of them is 129, and the smallest number is 10 Vulcan Kilns.

Vulcan Kilns, once used, are always used. There are reasons for this, and among these reasons is that fact that Vulcan Kilns render efficient service for long periods of time. Every one of the 349 Rotary Kilns mentioned above are still on the job and many of them have been in service twenty and twenty-five years.

Just why Vulcan Kilns render efficient service for so long a time is told in the latest Kiln Bulletin. Write for your copy.

VULCAN IRON WORKS

Wilkes-Barre, Pa.

Established 1849

New York Office:
50 Church St.

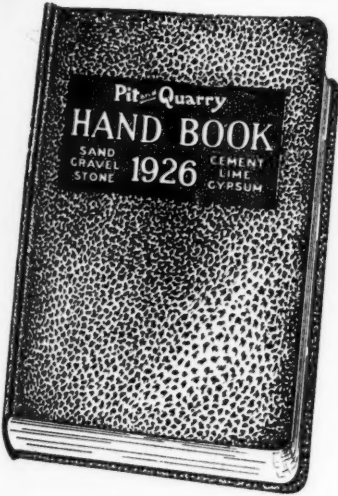
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VULCAN of WILKES-BARRE
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Pit and Quarry

HAND BOOK

1926 Edition

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Better than Ever

It's a library—in one volume

Every individual, concerned in anyway with the production or manufacture of non-metallic minerals or with the manufacture or sale of equipment to this field of industries should possess a copy of the 1926 HAND BOOK.

It contains authoritative treatises on Plant Design, Methods of Operation, Cost Accounting, Management, Graphs, Table and a Catalog of Equipment.

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CHICAGO, ILLINOIS

THE CRUSHERS

with the
Troubles Left Out

WHY THEY LEAD

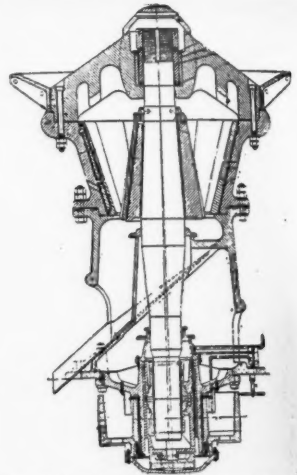
- 1—They are noiseless and run like watches.
- 2—50% greater capacity for same power.
- 3—Practically no wear on anything but head and concaves.
- 4—Short shaft and saving in head room with packed dust collars.
- 5—Shaft reinforced with self-locking head so that it cannot break where 90% of shafts have broken.
- 6—Can be driven right, left, or standard, as sent from shop.
- 7—Eccentric is turned by flexible coupling attached to pulley, which prevents side thrust and heating, as in geared crushers.
- 8—Ball and socket eccentric, self-aligning, eliminating friction and heating. Runs for years without attention.
- 9—Positive circulating oil system through filter and cut geared oil pump.
- 10—Made in our own shop by experts, trained for the job.
- 11—It is a crusher with the trouble left out. See it in operation, and you are unfit to listen to any geared crusher salesman. In fact, if you are near one of his machines, you can't hear him, if you are so inclined.
- 12—Our fine crusher does the work of 4 geared crushers.

Send for catalogue and tell us what your problems are, and one of our experts will call on you without obligation on your part.

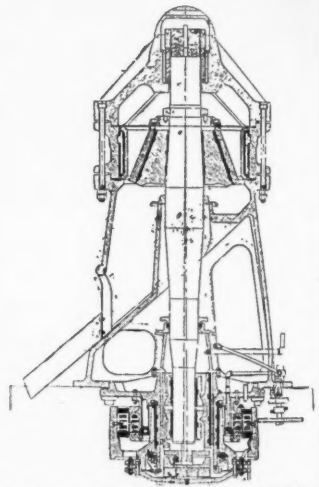
KENNEDY VAN SAUN MFG. & ENGR. CORP.
50 Church St. NEW YORK

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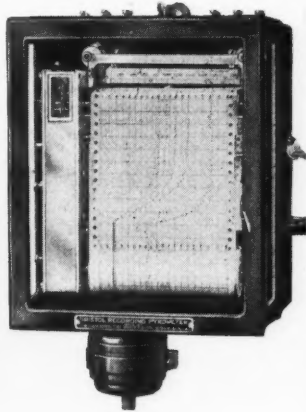
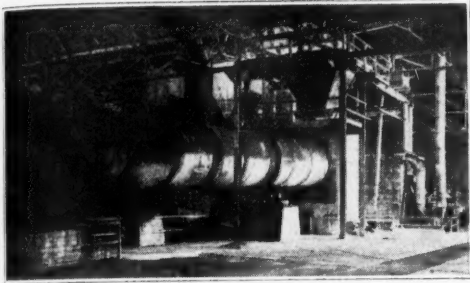


Standard Ball Bearing Gearless Crusher.
Sizes No. 1 to No. 60—Weights 1,000
to 900,000 lbs.



Gearless Crusher for Fine Crushing
Do not be deceived by Vertical Con-
caves; that is not what makes a fine
crusher.

Heat Regulating and Control in CEMENT KILNS



A temperature record taken at several points of the kiln flow shows the slightest variation in temperature and helps to eliminate guess work. No other method can compete with it.

BRISTOL'S Multiple Fire End Control Pyrometers


are of great convenience because temperature readings can be taken at several different points of the kiln. These instruments are furnished to register from one to six different temperature records on the same chart.

Bristol's Pyrometers are an essential aid in maintaining heat control. They give your superintendent enthusiastic interest, and he does better work. They conserve heat, keep down fuel cost and insure efficiency of process.

Send for Pyrometer Book No. 1401. Don't hesitate to call on our engineers for advice.

The Bristol Company  Waterbury, Connecticut

FOR 36 YEARS  MAKERS OF 

BRISTOL'S  RECORDING INSTRUMENTS



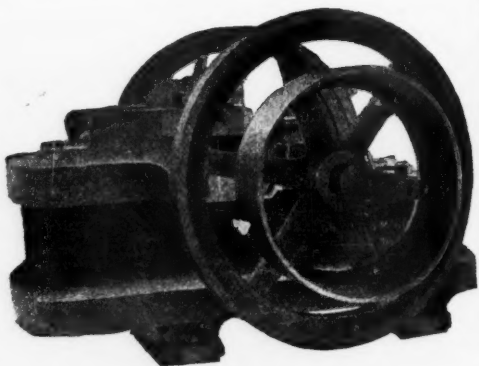
Lewistown Sand Washers—
highly recommended
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GLASS SAND

IS YOUR PROBLEM LISTED HERE?

We are in position to help you meet your problem in a speedy, satisfactory manner, if it pertains to crushing, grinding, screening, washing, drying or conveying, for we manufacture a full line of this equipment for pit and quarry service.

These are reasonably priced, well built, compact outfits—efficient and quickly installed.

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Grasselli Helps You Get Out More Stone



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Year after year more quarrymen are depending upon Grasselli to speed up production, get out more rock and increase profits. And, the results they get prove the wisdom of their choice.

Blasting with Grasselli Explosives brings the stone down clean from the face in the proper size for fast loading. Pop-shots are reduced to a minimum and work is speeded up all along the line.

Whether your work requires high speed detonation for shattering the rock or whether you want slow, heaving action, you can get them with the right grade of Grasselli Explosives.

There is a Grasselli mill or magazine close to you with all facilities for fast delivery and insuring you fresh explosives on every order. For prompt service, write, wire or phone our nearest office.

THE GRASSELLI POWDER COMPANY
Main Office: Cleveland, Ohio

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EASTON QUARRY CARS



STEEL *versus* WOOD

It is false economy to use wooden body cars in a stone quarry, especially so if the cars are loaded by a shovel.

This photograph shows a light all steel car loaded by hand for 10 years and by shovel for the last 4 years. These cars have been in use over 14 years without a dollar's repair to the steel bodies.

The annual, if not daily, repairs to wooden body cars does, we admit, give steady employment to a lot of men, but why not save this expense and use steel cars?

EASTON CAR & CONSTRUCTION CO.

Kansas City, Mo., and Easton, Pa.

New York Chicago Pittsburgh Philadelphia San Francisco

EASTON CARS

FOR EVERY PIT MINE & QUARRY

Telsmith "INSURANCE"

what it really means

Even the mechanical vigilance of the magnetic separator will not always keep out the dreaded tramp iron. The owner of any secondary crusher is always facing its menace. But the owner of a Telsmith Reduction Crusher is **insured** against it.

One usually thinks of insurance as an indemnity against loss—a reimbursement for replacements. And Telsmith "Insurance" — as embodied in the Telsmith Guarantee—**does** cover frame, crown and main shaft against breakage for two years, even by tramp iron—the broadest, most inclusive warranty any crusher manufacturer ever made. But Telsmith "Insurance" means more than the replacement of broken parts.

With a breakdown **production stops**. There is an addi-

tional loss of payroll, overhead and profits far greater than the cost of repairs. With Telsmith the shut-down is prevented. Rugged brute strength is Telsmith's "long suit." It is extremely short, with a fixed shaft, guaranteed unbreakable, forming a huge bolt through the whole structure. **Both frame and crown are steel**, with massive walls reinforced by heavy ribs. The Telsmith Reduction Crusher stands the gaff where other secondary crushers fail. Telsmith is master of the unexpected—it defies tramp iron.

Bulletin No. 2F15 (Telsmith Reduction Crusher) and Catalog No. 161 (Telsmith Primary Breaker) show fully why Telsmith is practically tramp iron proof. We'll mail them gladly.

SMITH ENGINEERING WORKS

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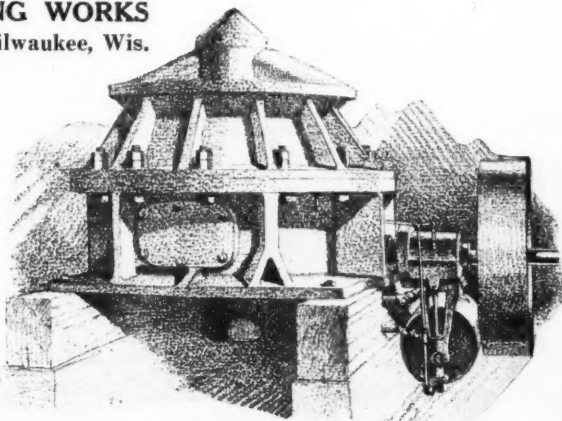
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Columbus, Ohio

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The Advance Drill Guard at Signal Mountain

WHEN the Signal Mountain Portland Cement Co., at Chattanooga, Tennessee, first opened their quarry, they purchased two used Cyclone Drills of the water well type to take care of their drilling requirements temporarily.

These two drills had already seen several years of service and were never intended for the steady, severe grind of quarry work. The rock formation, like most southern limestone, is far above average hardness and is seamy and creviced, as the above photograph of the quarry face shows. Furthermore, the drills were equipped with a heavier string of drilling tools than we recommend for machines of this size.

In spite of these adverse conditions,

these two small Cyclone Drills did the Signal Mountain job satisfactorily for more than two years.

Recently the Signal Mountain capacity has been increased by the addition of new units which meant more limestone. A new No. 14 Cyclone Electric Blast Hole Drill built especially for quarry work was installed in July, 1925, and now a second new machine of the same type is on its way to the job. These two new drills will supplement the efforts of the old outfits who blazed the trail and whose record helped sell the new machines.

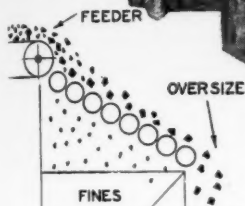
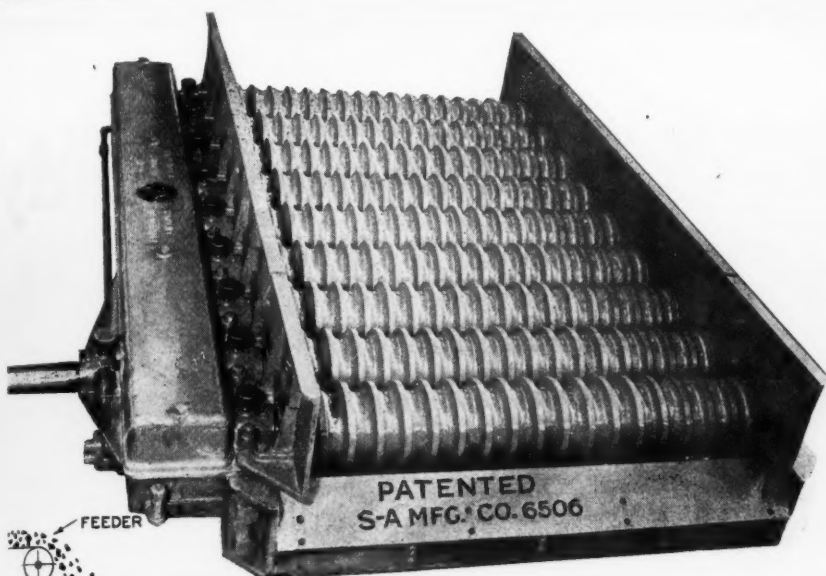
Our 120-page book, "Big Blast Hole Drills," is of interest and assistance to anyone quarrying crushed stone. Ask for a copy.

The Sanderson-Cyclone Drill Co.

Orrville, Ohio

Eastern and Export Office, 30 Church St., New York

CYCLONE NUMBER FOURTEEN **BIG BLAST HOLE DRILLS**



LIVE ROLL GRIZZLY OPERATION

**PATENTED GRIZZLY
DESIGNED AND BUILT BY
S-A ENGINEERS**

This machine imparts a wavy motion to the load and the fines settle with this action and pass through the moving openings. Graduated speeds of each individual set of rolls eliminates all chance of clogging. Surprisingly small power input is required to operate. Massive in construction. Requires no attention. Drive mechanism completely enclosed and lubricated by power driven oil pump.

Here is a carefully designed and well built machine for gravel and stone plants.

WRITE TODAY

STEPHENS-ADAMSON MFG. CO.
AURORA ILLINOIS

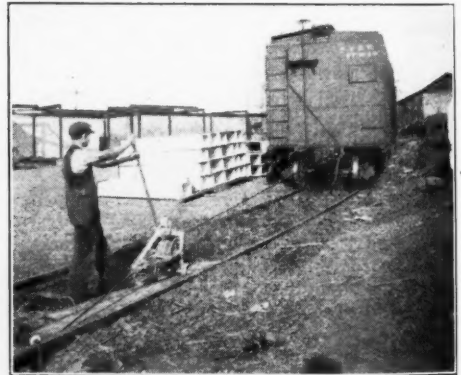
**S-A LIVE ROLL
GRIZZLY**



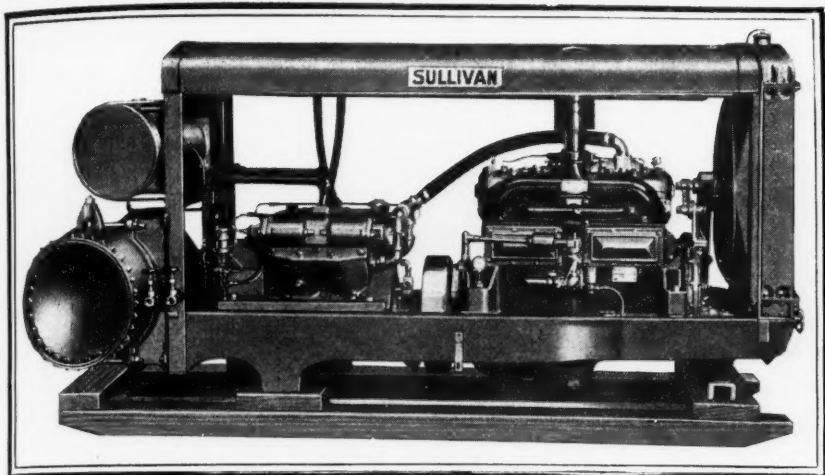
Handy-Andy Junior

The Big Little Puller

Simple, all-steel, portable, one-man puller for spotting and pulling cars, moving heavy machinery, hauling out stalled and overturned trucks, etc. 10 to 40 tons capacity. Weighs 180 pounds. Has automatic reverse. Made in power sizes also. Write for circular B for details.



John Waldron Corporation
NEW BRUNSWICK NEW JERSEY



Buda-equipped Sullivan Portable Compressor

With records like this—

Buda-equipped Sullivan Portable Compressor

Non-stop test run of one week

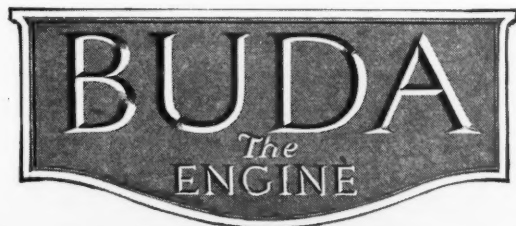
Under full service conditions

<i>Total hours run</i>	-	168
<i>Air pressure carried</i>		85-100 lbs.
<i>Speed</i>	- - - -	750 R. P. M. (approx.)
<i>Total revolutions</i>	-	7,500,000 (approx.)
<i>Gasoline consumed</i>		339 quarts
<i>Oil consumed in engine</i>		1 quart

During entire 168 hours no adjustments of any nature were made.

It's easy to make sure of low-cost, continuous service—specify BUDA POWER

THE BUDA COMPANY, HARVEY, CHICAGO
SUBURB ILLINOIS
ESTABLISHED 1881



O T T U M W A

**IS
THE
WAY
TO
LOAD**



THERE are two ways to increase your profits—
increase your production or cut down your production costs. Do both—load with the Ottumwa. This modern device not only loads steadily and speedily, prevents delays and increases capacity—it also eliminates the loading gang. One man can operate it easily.

The Ottumwa is operated with electric or gasoline power, has roller or ball bearings and the latest improved alemite greasing system.

IT PILES UP THE PROFITS

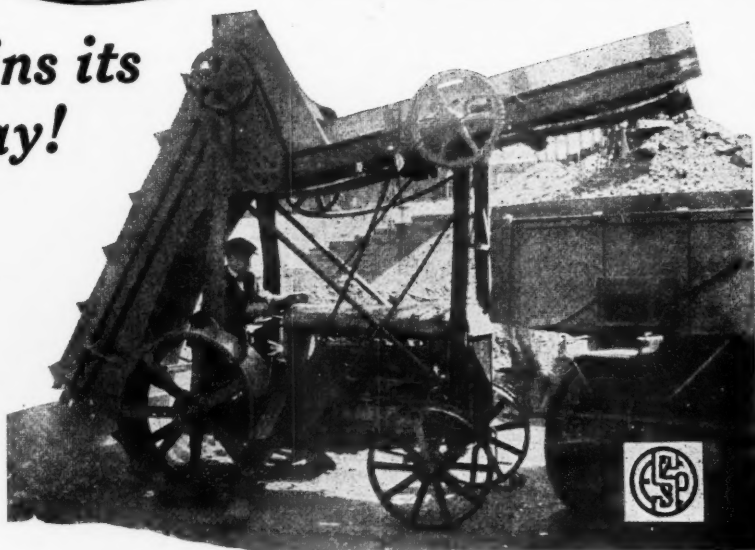
**OTTUMWA
BOX CAR LOADER
COMPANY
OTTUMWA, IOWA**



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INFORMATION**

Specialty Fordson Loader

*Wins its
Way!*



You Want the Best Loader Made!

The Specialty Fordson Loader is the answer to the demand for a portable loader moving and operating under its own power. There is no more compact loader made, for this outfit has much greater power than the conventional stationary outfit, and at but slight additional cost.

The Specialty Fordson Loader crowds while the buckets are in operation, independent of reverse gear, and it can be crowded much or little at a time. The crowding mechanism is self-contained with gears running in oil. The feeders clear a path sufficient for the tractor wheels. If you want simplicity of operation and dependability, install a Specialty.

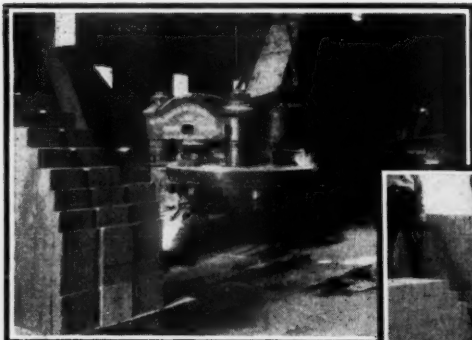
Write for full information, mailed on request.

Specialty Engineering Company
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Made Today

Laid Tomorrow



TODAY



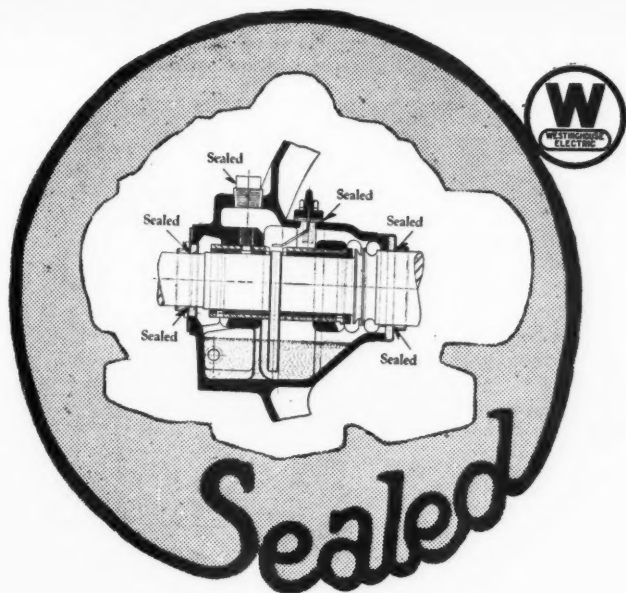
TOMORROW

There's Profit in the Turn-over

and the turnover is large, for these smooth, handsome bricks are in big demand today. Sand-Lime Brick, unlike most brick which require weeks in the making, and call for expensive equipment, are easily manufactured. A press, grinding pan and hardening cylinder are the bulk of equipment needed to make this fine durable product—an artificial stone in brick size.

*Write for detailed and equipment
Bulletin*

THE HADFIELD-PENFIELD STEEL CO.
Bucyrus, Ohio



Oil Can't Get Out

INSULATION insurance is provided for Westinghouse Motors by the Westinghouse Sealed Sleeve Bearing. The oil stays where it belongs—in the Sealed Sleeve Bearing; the insulation remains as it should—free from oil.

Even the air pressure created by a rapidly-running high-speed motor cannot suck or force the oil out of the Sealed Sleeve Bearing. Nor can dust enter it. The cushioning effect of a film of clean oil, completely surrounding the shaft, is always present.

Thus Westinghouse Motors, with Sealed

Sleeve Bearings take on an added lease of life through perfect lubrication and positive protection against the insulation troubles that come from oil-soaked windings. The shock and stress-absorbing ability of the large bearing surface is further multiplied by the ever-present cushioning oil film.

The Sealed Sleeve Bearing is a Westinghouse feature, exclusively—and declared to be the outstanding mechanical improvement of motors in 25 years. Oil can't get out; dust can't get in.

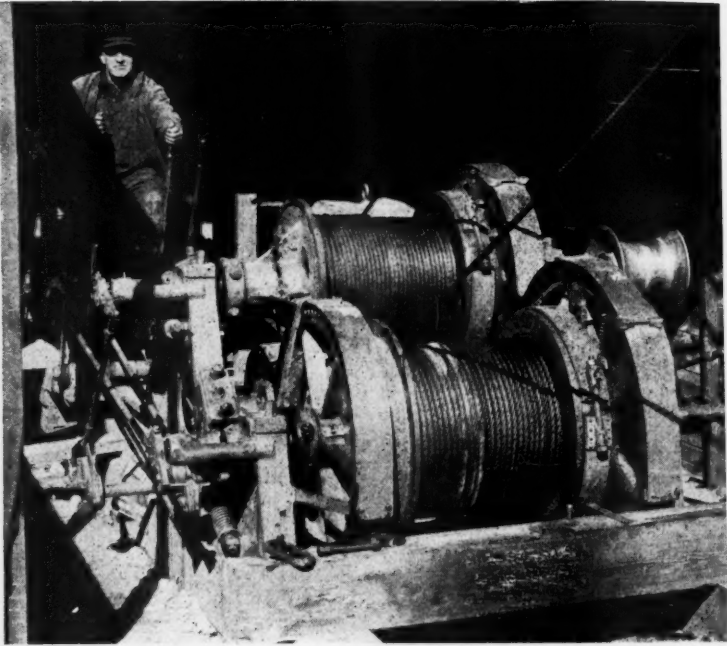
**There's plenty of performance proof
Ask Us for the "Evidence"**

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pennsylvania

Sales Offices in All Principal Cities of
the United States and Foreign Countries

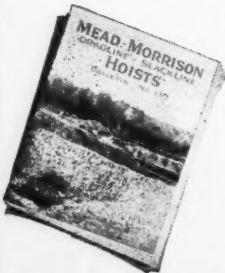
Westinghouse Motors *with* Sealed Sleeve Bearings

MEAD-MORRISON



Slackline Efficiency

Look to your Hoist—the efficiency of your plant demands it! Mead-Morrison offers you a Slackline Hoist that meets every requirement of this kind of excavating. It has Automatic Brakes and a patented two-speed device with drive by a continuous running electric motor that builds up torque as the load increases. Only 5 levers are needed for complete operation—other machines built for this work having 7 to 10 levers. This ease of control means less trouble for the operator—more tonnage for the owner.

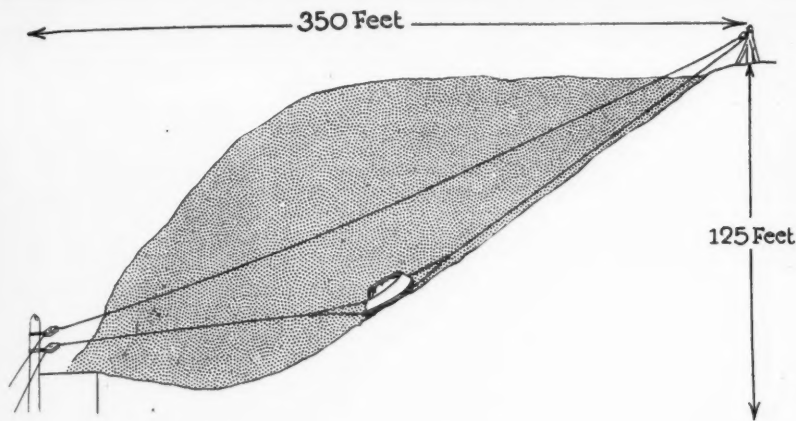


Write for Bulletin No. 130

MEAD-MORRISON
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HOISTING - HAULING - HANDLING

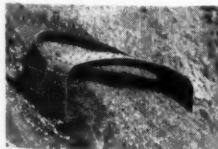


How One Man Brought a Hill of Sand and Gravel, 125 Feet High, to the Screening and Washing Plant



Send for this month's **Sauerman News**.

The **Sauerman News** is a monthly publication of interest to every practical sand and gravel operator—and to every man interested in excavating. It illustrates interesting and



peculiar digging and conveying jobs. It shows current **Sauerman Layouts** that are saving money for their users.

And it will show you how other men are handling excavating problems that are, no doubt, quite similar to your own.

Send for the current issue.

In South Dakota, a sand and gravel company had an excellent material deposit. It was in the form of a large hill, 125 feet high, covering about 25 acres.

The screening and washing plant was at the foot of it.

The problem was to move the hill down to the plant—fast enough to assure good production and with the least possible expense.

Sauerman was called upon. Recommendations were made which resulted in the layout shown above—and a **Sauerman** 1½ yard **Power Drag Scraper**, operating over a 350 foot span, was installed.

The need for two sets of expensive equipment is eliminated. The **Sauerman Scraper** handles the two operations of digging the material and carrying it to the screening and washing plant.

In addition, the gang usually required for these two jobs, is reduced to one man, the scraper operator.

And but six men are all that are needed to run the entire plant.

There, briefly, is a practical story on how **Sauerman Power Drag Scrapers** help to make sand and gravel pits pay dividends.

They dig the material and they carry it. And the scraper operator is the only man needed for practically all of the excavating work.

This month's issue of the *Sauerman News* illustrates some interesting **Sauerman** installations—and shows how they are helping gravel pit owners towards bigger dividends. A copy will be sent you upon request. Just ask for the current issue of *Sauerman News*.

SAUERMAN BROS., INC.

434 S. CLINTON STREET
CHICAGO, ILLINOIS

Representatives in 29 Principal Cities

SAUERMAN

SLACKLINE CABLEWAYS • POWER DRAG SCRAPERS

**Cut down your handling costs now,
so that they will stay down
for the next
15 years or more**

When you buy a WILLIAMS Bucket you are getting lower handling costs — because of the extra output every day, and extra years of service.

Here's how it works out: Chas. Warner Co., of Devault, Pa., write of a WILLIAMS "Stand-pace" Bucket:



"The 1½ cu. yd. WILLIAMS we bought in 1910 is still at work. Repair costs have been very low in view of the tonnage moved; it has given us better service than any other bucket."

There are many more such cases— hundreds of them— where WILLIAMS Buckets are in active use today, after more than 12 to 15 years of hard work.

In the complete WILLIAMS line, you will find a bucket that has the digging power and capacity you need— a bucket that will serve you for years. Glad to send complete specifications. Just write us—

G. H. WILLIAMS COMPANY, 605 Haybarger Lane, Erie, Pa.

Eastern Sales Office: 30 Church St., New York City.

WILLIAMS
FAST-DIGGING BUCKETS
All Parts Guaranteed Against Breakage

Free Service to our readers

For the convenience of readers who are in the market for equipment, our "Free Service" department will furnish on request any information, catalogs and prices on any machinery, equipment or supplies used in pits and quarries. The coupon below makes it easy for you. Simply check, sign and mail.

Pit & Quarry, Rand McNally Bldg., Chicago, Ill.

Pit and Quarry, Research Department,
Rand McNally Bldg., Chicago, Ill.

WE ARE IN THE MARKET for the items checked below, and would be glad to receive catalogs, prices or other information.

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(GaugeIn.) | <input type="checkbox"/> Dredges, Land |
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- Loaders, Bin, Portable
- Loaders, Boom and Bucket
- Loaders, Box Car
- Loaders, Conveyor
- Locomotives, Electric (Gaugein.)
- Locomotive, Gasoline (Gaugein.)
- Locomotives, Steam (Gaugein.)
- Locomotives, Storage Battery (Gaugein.)
- Log Washers
- Lubricators
- Magnetic Separators
- Manganese Steel
- Manganese Steel Parts
- Marble and Granite Working Equipment
- Metal, Babbitt
- Metal, Perforated
- Meters
- Mills, Chaser
- Mills, Tube
- Motors, Electric (H. P.)
- Motors, Gasoline (H. P.)
- Motors, Gasoline Portable Power Unit (H. P.)
- Motor Truck Dump Bodies
- Motor Trucks
- Nozzles, Hydraulic Mining
- Nozzles, Suction Screen
- Oil Burners
- Oils and Lubricants
- Perforated Metal
- Picks and Shovels
- Pipe, Hydraulic
- Pipe, Iron
- Pipe, Spiral
- Plows
- Powder, Blasting
- Powder Magazines, Steel
- Power Transmitting Equipment
- Power Unit Gasoline, Portabile (H. P.)
- Pulverizers, Hammer
- Pulverizers, Ring
- Pulverizers, Roll
- Pump Repairs
- Pumps, Drainage
- Pumps, Dredging
- Pumps, Sand
- Pumps, Water Supply
- Pyrometers
- Rail, Steel
- Rolls, Crushing
- Roofing and Siding (Iron, Steel, Zinc)
- Rope, Manila
- Rope, Wire
- Sand-Lime Brick Machinery
- Scales, Automatic, Conveyor
- Scales, Track
- Scrapers, Power
- Scrapers, Team
- Screening Equipment (See other side)
- Screens, Perforated Metal
- Screens, Rotary
- Screens, Vibrating
- Separators, Air
- Separators, Gypsum
- Separators, Magnetic
- Separators, Sand
- Sheaves
- Shovels, Electric (.....yd.)
- Shovels, Gasoline (.....yd.)
- Shovels, Steam (.....yd.)
- Speed Reducers
- Steel Barrels
- Steel, Drill
- Steel, High Speed
- Steel, Manganese
- Steel, Structural
- Steel, Tool
- Stokers, Automatic
- Stone Grapple
- Stripping Equipment, Power
- Superheaters
- Swinger, Derrick
- Tachometers
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- Tanks, Settling
- Tanks, Steel
- Tanks, Steel Welded for Air, Water and Gasoline
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- Tramways, Aerial
- Transformers, Electric
- Trolley Carriers
- Trucks, Electric
- Tube Mills
- Turbines
- Unloaders, Bin
- Unloaders, Boom and Bucket
- Unloaders, Conveyor
- Wagons, Dump
- Washers, Log
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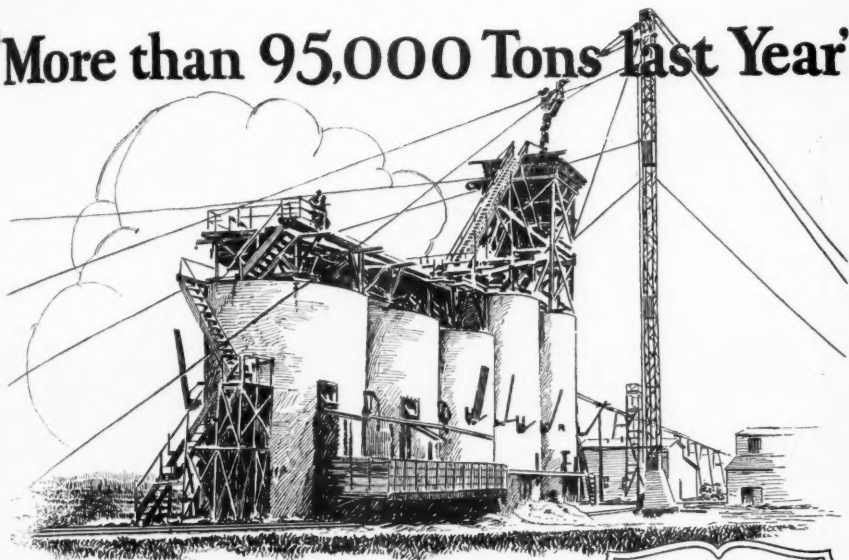
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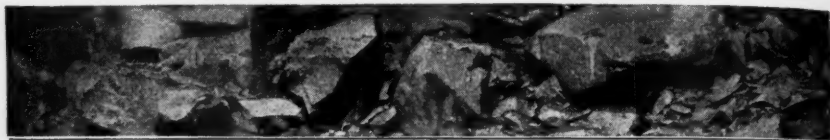
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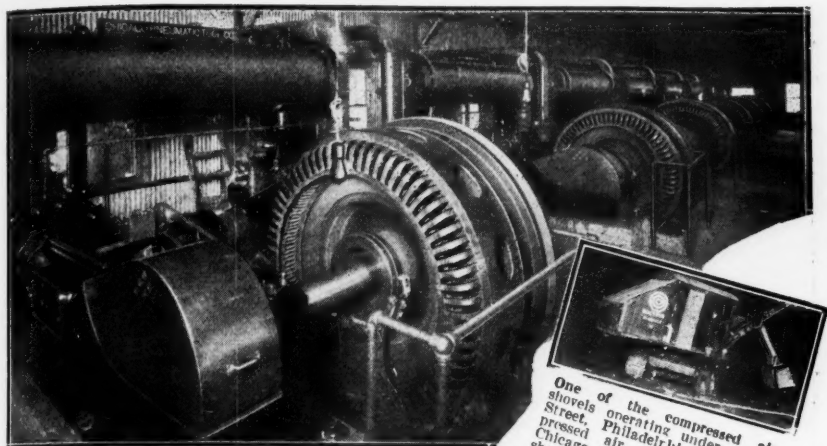
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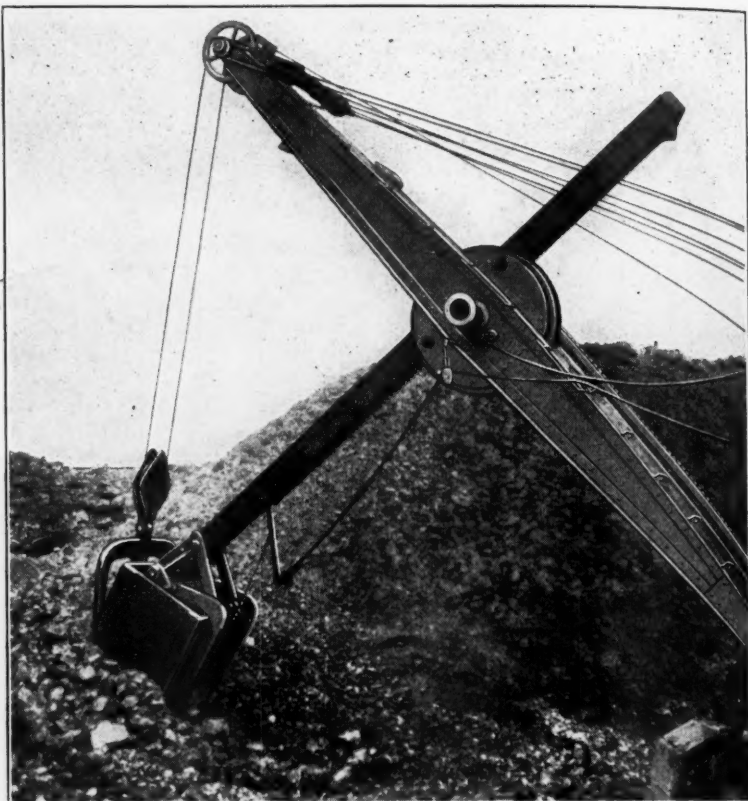
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Index to Advertisers

Vol. 11

CHICAGO, ILL., MARCH 15, 1926

No. 12

American Hoist & Derrick Co.....	18	Leschen and Sons Rope Co., A.....	69
American Steel and Wire Co.....	130	Letson Co., T. H.....	116
American Well Works.....	20	Lewistown Foundry and Mach. Co..	26
Armstrong Mfg. Co.....	133	Lidgerwood Mfg. Co.....	137
Atlas Car & Mfg. Co.....	119	Loomis Machine Co.....	123
Atlas Engineering Co.....	131	McEwen Bros.....	134
Austin Mfg. Co.....	120	McLanahan-Stone Machine Co.....	132
Bacon, Inc., Earl C.....	121	Magnetic Mfg. Co.....	139
Bay City Dredge Works.....	122	Manganese Steel Forge Co.....	133
Blaw-Knox Co.....	127	Marion Steam Shovel Co.....	124
Bollinger-Andrews Const. Co.....	119	Mead-Morrison Mfg. Co.....	38
Bradley Pulverizer Co.....	16	Minneapolis Steel and Machy. Co..	137
Bristol Co.....	25	Morrison and Risman Co., Inc.....	114
Broderick and Bascom Rope Co.....	45	Mullins Body Corp.....	125
Brookville Truck & Tractor Co.....	6	Mundy Sales Corp.....	43
Brown Hoisting Machy. Co.....	50	Naylor Spiral Pipe Co.....	112-113
Browning Crane Co.....	129	New Holland Machine Co.....	121
Buckeye Dryer Co.....	128	O. K. Clutch & Machinery Co.....	124
Buda Co.....	33	Ohio Locomotive Crane Co.....	129
Burch Plow Works Co.....	134	Orr & Semower, Inc.....	136
Burkhardt Co.....	130	Ottumwa Box Car Loader Co.....	34
Burnham, Royal E.....	122	Owen Bucket Co.....	122
Burrell Eng. and Const. Co.....	119	Pennsylvania Pump and Compressor Co.....	123
Caldwell and Son Co., H. W.....	138	Perfect Classifier Co.....	132
Chicago Perforating Co.....	122	Porter Co., H. K.....	72
Chicago Pneumatic Tool Co.....	47	Power Mfg. Co.....	135
Conveying Weigher Co.....	127	Randolph-Perkins Co.....	122
Curtis Pneumatic Machinery Co.....	14	Russell & Co.....	8
Day Pulverizer Co.....	121	St. Mary's Oil Engine Co.....	119
Diamond Machine Co.....	136	Sanderson Cyclone Drill Co.....	30
Domestic Engine & Pump Co.....	128	Sauerman Bros.....	39
Du Pont de Nemours & Co., E. I.....	9	Seaverns Co., James B.....	120
Eagle Iron Works.....	125	Smith Engineering Works.....	29
Easton Car and Const. Co.....	23	Sonken-Galamba Corp.....	114
Economy Pumping Machy. Co.....	122	Sonntag, C. H.....	126
Ensign-Bickford Co.....	Front cover	Southern Iron & Equip. Co.....	114
Equipment Corporation of America	115	Spears-Wells Machinery Co.....	131
Erie Pump and Engine Works.....	122	Specialty Engineering Co.....	35
Erie Steam Shovel Co.....	3	Stephens-Adamson Mfg. Co.....	31
Fate-Root-Heath Co.....	70-71	Stevenson Co.....	52
Flory Mfg. Co., S.....	124	Symons Bros. Co.....	2
Galland-Henning Mfg. Co.....	17	Taylor-Wharton Iron and Steel Co..	120
Gay Co., Rubert M.....	126	Thew Shovel Co.....	48
General Motors Truck Co.....	10-11	Thomas Elevator Co.....	123
Goodyear Tire and Rubber Co.....	46	Toepfer and Sons Co., W.....	122
Grasselli Powder Co.....	27	United Motors Products Co.....	13
Gruendler Patent Crusher and Pulverizer Co.....	123	Universal Crane Co.....	124
Hadfield-Penfield Steel Co.....	36	Universal Vibrating Screen Co.....	121
Hardinge Co.....	120	Used Equipment Bargains.....	114-119
Harnischfeger Corp.....	19	Vulcan Iron Works.....	22
Heil Co.....	15	Waldron Co., John.....	32
Heineken, W. P.....	116	Waukesha Motor Co.....	4
Hercules Motors Corp.....	21	Western Wheeled Scraper Co.....	111
Hydraulic Hoist Mfg. Co.....	12	Westinghouse Electric & Mfg. Co..	37
Industrial Works.....	74	Whitcomb Co., Geo. D.....	7
Inslay Mfg. Co.....	Back cover	Willamette Iron and Steel Works..	126
Interstate Equipment Corp.....	135	Williams Co., G. H.....	40
Kansas City Hay Press Co.....	130	Wood Drill Works.....	126
Kennedy-Van Saun Mfg. and Eng. Corp.....	24	Worthington Pump and Machy. Corp.....	138
Koehring Co.....	5		
Koppel Industrial Car & Equipment Co.....	73		

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Vol. 11

CHICAGO, ILL., MARCH 15, 1926

No. 12

FEATURE CONTENTS

How the Alliance Quarry Was Made to Pay 55	Pass it on
F. A. Westbrook discusses in this illustrated article the methods by which the Alliance Quarry of the Penryn Slate Company was made to show a profit.	..... <i>President</i>
Measurement of Accident Prevention by Compensation Insurance Rates. 61	..... <i>Vice-Pres.</i>
Byron O. Pickard considers insurance as the experience of a group rather than of an individual and the probability of any loss becoming more accurately measured as experience is accumulated and data are analyzed.	..... <i>Secretary</i>
Putting Swedeland Slag on the Market from Grit to Ballast. 65	..... <i>Treasurer</i>
An illustrated article featuring the operations of the Philadelphia Slag Company at Swedeland, Pennsylvania.	..... <i>Gen. Mgr.</i>
Novel Producing and Marketing Methods Applied to Sand and Gravel Business. . . 75	..... <i>Sales Mgr.</i>
An illustrated article featuring the operations of the Granite Sand and Gravel Company at Indianapolis and Morristown, Indiana.	..... <i>Traffic Mgr.</i>
Material Handling and Waste Disposal Solved by an Ingenious Method. 81	..... <i>Engineer</i>
George Ransom discusses in this illustrated article, the operations of the Eureka Slate Company at Fair Haven, Vermont.	..... <i>Supt.</i>
Compressed Air and Air Compressors. . . . 87	..... <i>Foreman</i>
The third part of an article by C. H. Sonntag. The various types of compressors are discussed, i. e., vertical single acting, air brake pumps, single cylinder horizontal, horizontal tandem two stage, cross compound, angle compound, duplex angle compound, and portable.	..... <i>Purch. Agent</i>
An Efficient Pre-Mixing Concrete Plant. . . 93	
E. D. Roberts discusses the operations of the Pre-Mixed Concrete Company's new plant at San Diego, California.	

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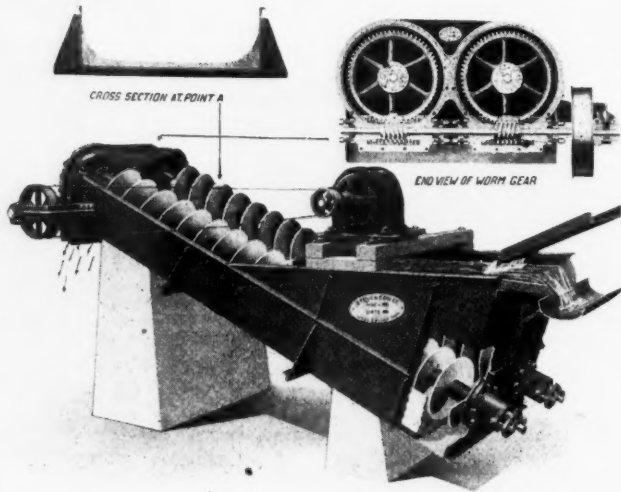
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Pit *and* Quarry

Vol. 11

Chicago, Ill., March 15, 1926

No. 12

A Service Recommended for Consideration By Trade Associations

CONDITIONS of supply and demand in the non-metallic mineral industries are certainly far from being stabilized. It is not to be expected that the relation of these two factors can ever be completely stabilized, but there certainly is need of a more careful study which should have as its object the improvement of the present relation between supply and demand. To balance supply and demand would require an absolute control of production and distribution, and we are not prepared to admit that there is any such authority capable of bringing this about. Public policy does not permit control of supply and demand through monopoly. The control of supply and demand by direct action of the government is not practical. The demand for cement, lime, gypsum, crushed stone, sand and gravel, etc., cannot successfully be regulated by government order except possibly in times of war. It is highly improbable that any government or commission would have the ability or knowledge to control efficiently the production of any one of these products. In considering the problem of supply and demand in the non-metallic mineral industries, it must be remembered that such factors as legislation, public sentiment, weather conditions, competition between groups, car shortage, etc., react to a marked degree.

Public policy demands a system of operation which is free, fair in competition, and largely self-regulating. Any method for balancing supply and demand must not infringe upon that policy. In any system two factors necessarily need to exist, (1) a free, unrestricted market, and, (2) a group of independent sellers and buyers, fully informed as to existing conditions in their market.

One of the government's main functions is to keep the markets free from unreasonable restraints. Our laws

tend to stabilize business. Any attempt to intimidate competitors or to exploit the public should be punished by the government. A condition of overproduction would encourage the adoption of policies in violation of the law, and overproduction often forces the price of a commodity far below the price of production, and rather than face financial ruin, individuals enter into agreements really a self-protection, even though they be in violation of the law. Local efforts to restrict trade in any of the non-metallic mineral industries have often resulted from periods of overproduction. The fact is that all of the producers in any of the major divisions in the non-metallic mineral industries cannot run their plants full time without producing a stock so large that it cannot all be sold in this country. The law requires that we maintain a free unrestricted market, but it does not restrain any method which will decrease the cost of production or distribution which does not restrict competition.

The second factor which needs to be considered in adopting a system that does not conflict with public policy permits a group of independent sellers and buyers to be fully informed of the existing conditions of their market. The non-metallic mineral industries are, in fact, more than a group of local industries. The past few years have seen an expansion which makes them in fact national and in some instances international. This expansion has made it difficult for buyers and sellers to secure accurate and comprehensive information as to basic conditions in these industries. The risks and factors affecting business have increased and there seems to be something lacking in the knowledge of existing conditions.

The government recognizes the need for accurate information in some markets and spends huge sums annually

in gathering statistics from every available agency to keep buyers and sellers accurately informed as to changes in the market. So far as agriculture is concerned, which is the principal interest of the government in this work, it is generally accepted that these statistics have a steadying influence. Why not have a widespread dissemination of facts concerning the market in the various non-metallic mineral industries? Various trade associations within the non-metallic mineral industries should and could supply this service. Their proper use of trade statistics should have a constructive and stabilizing influence. If the trade associations comply in good faith with the rules set down by the Supreme Court, competition so far as the non-metallic mineral industries are concerned, will function on a firmer footing than at present.

If statistics showing the annual capacity, the annual production and the annual consumption of a commodity, as compiled by the individual trade association, were distributed widely among business men, bankers and investors, it would tend to retard the construction of plants in excess of those needed to supply the demand, which seems to be the danger at the present time. The bankers are generally cautious in loaning money for new construction in an industry already over built. Investors certainly would not be so willing to place their funds in new plants if the productive capacity of that industry were in excess of the demand.

The current conditions of supply and demand, if compiled semi-weekly, weekly or monthly, as the conditions warranted, would be of assistance to business men in heading off conditions which would disrupt the stability of the market. Frequent release of statistics showing the stocks on hand at the beginning of a certain period, new production during that period, shipment on filled orders, sales, etc., would head off any panicky action on the part of producers or consumers who frequently act without facts to protect themselves against a suspected pending loss. If these statistics, for instance, showed stocks to be piling up, the consumer would be less apt to purchase at existing price levels and the producer would have a chance to reduce his production before the prices go below cost. If the figures show a shortage, consumers will begin to

offer higher prices and production will be increased. It is over-production and under-production that these statistics should be made to offset.

A confidential exchange of cost figures through the trade association among the member producers would also have a stabilizing influence. Two factors generally govern any price policy, namely;—the condition of supply and demand and the cost of production. To our knowledge there are many producers in the non-metallic mineral industries who have no cost system and who know only vaguely their costs. There occurs frequent selling below cost without knowing it and this competition has a disastrous effect. A uniform cost accounting system could be adopted by each trade association and statistics compiled showing without identification the individual detail costs of their members. Such information would undoubtedly tend to bring prices into closer relation to actual cost of production. It would afford the smaller producer who cannot maintain a cost system a gauge of the average cost of production in the industry. It certainly is not good economics to knowingly sell below cost, unless the market conditions compel it. There is a great need for education of that class of producer who repeatedly decreases prices in total ignorance of costs. Such competition is not efficient. It is, in fact, harmful to others.

A tendency towards stabilization in prices resulting from the increased efficiency of members of any industry is in keeping with the spirit and purpose of a competitive system approved by public policy. A comparison by one producer of his costs with the costs of his competitors, where the average cost is compiled by a trade association, will often reveal items in his costs which are out of line with those used as a basis of comparison. It is safe to assume that where he finds costs greater he will endeavor to correct the condition. This effort upon his part will tend towards more uniform costs which in general will mean reduced costs and ultimately a more uniform, or even a lower price to the consumer.

The trade associations in the non-metallic mineral industries can be powerful agencies, either for good or for evil. Their service should be directed towards rendering a constructive and stabilizing influence upon the industry which they serve.

How Alliance Quarry Was Made to Pay

By F. A. Westbrook

SOMETIMES one manager can make a business show a profit where another has been unable. After the change has been accomplished it all seems perfectly simple and obvious and yet the personal equation of the new manager was very likely responsible for the results.

Richard Griffiths, vice president and general manager of the Penrhyn Slate Company of Fair Haven, Vermont, enjoys running a slate business better than anything else he can think of. Consequently it is not surprising he has made a success of it and made the acquisition of the Alliance plant by his company a profitable venture. Just how this has been done is something which will interest, and may help, all quarrymen where much loose material must be handled.

The great accomplishment has been the introduction of labor saving devices. This applies not only to the purchase of some particular labor saving machine but also to simple arrangements, or rearrangements, of existing plant and apparatus. Mr. Griffiths has used both methods.

In the first place he purchased a steam shovel. This is an Erie, type A, ½ yard outfit which travels as a caterpillar tractor. This was originally intended to strip off the thirty foot surface covering over the slate. An air shovel known as the "Shoveloder," Model 107, made by the Nord-

burg Manufacturing Company, was also purchased to load waste material in the quarry into the "skips." However it does not travel under its own power and must have tracks. It is, consequently, much slower than the caterpillar tractor steam shovel.

The performance of these shovels was satisfactory and saved much labor, but after the Spring blasts of 1925 there was a great quantity of waste material in the quarry which it was desirable to clear away quickly so as to get at the good material. This quarry is not old or extensive enough to fill in worked out portions and in any event the waste has to be removed. The slate business being highly competitive, all savings are important.

Mr. Griffiths is not at all stubborn or set in his ways. What he is after is to quarry slate and produce shingles as economically as possible so anything within the limits of good policy toward that end is desirable. Therefore he took a week off to lower the steam shovel down into the quarry and bring up the air shovel.

The steam shovel, with its ability to move around can and does load 125 two and a half yard boxes of rubbish each nine-hour day which are taken out to the dump. Mr. Griffiths estimates that it would take 48 men and six more cable ways, with associated hoisting equipment and engi-



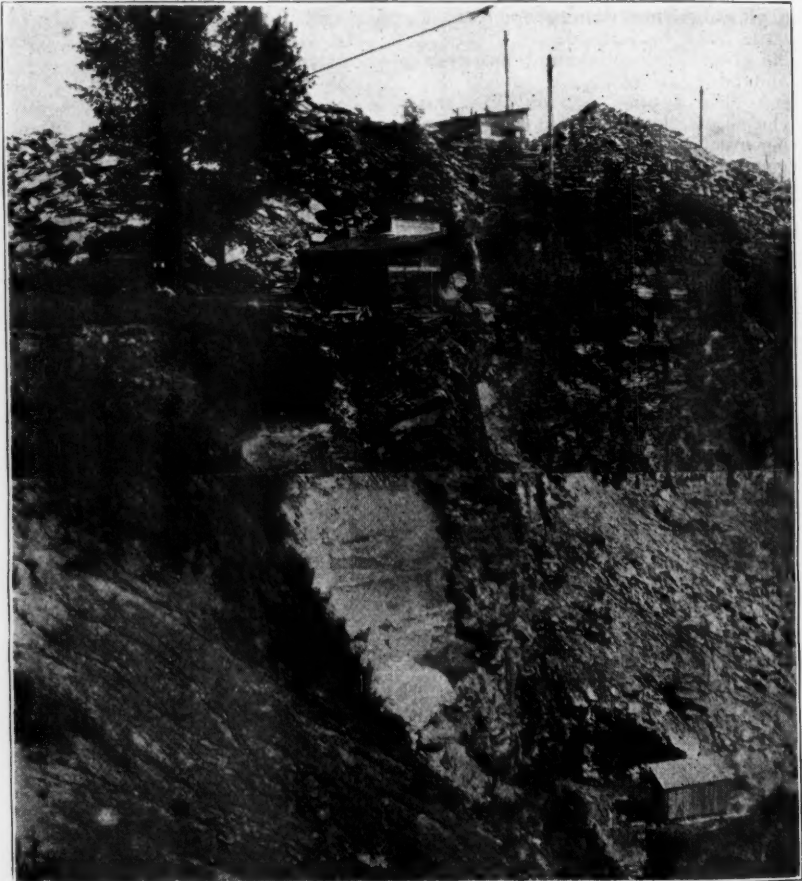
Steam Shovel at Bottom of Quarry Loading Refuse.

neers, to do this work. This shovel started operation in the quarry on May 18, 1925, and he feels sure that a conservative estimate of the savings made, based on the work actually done, since that time, is over \$20,000 in labor alone, and not counting the cost of the additional cable ways and hoists which would have been required. The cost of the shovel was \$8,200. The loading charge for rubbish has, furthermore, been reduced from 60 cents to 13 cents per cubic yard. So far this is the only steam shovel operating in any quarry in this region, but it seems probable others will not be long in profiting by this startling success.

The air shovel does satisfactory work in stripping the surface which does not call for so great speed and which does not have so direct a bearing on production.

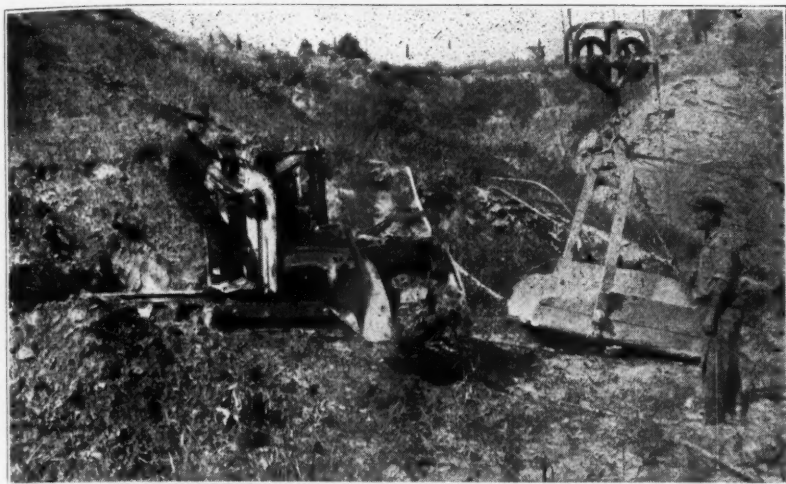
So much for new equipment. Now we come to the adaptation of old equipment to carry out the increase of efficiency. There are several outstanding features. One of these bears a direct relation to the use of the steam shovel in the bottom of the quarry.

In order not to limit the usefulness of the expensive steam shovel by the speed of the hoisting equipment, Mr. Griffiths arranged the latter so that the travel of the carriage along the cable way and the vertical travel of the box of rubbish take place simultaneously. As soon as the material has been raised sufficiently to clear the ground the horizontal travel may begin, it being only necessary to see to it that the load clears the edge of the quarry. Faster hoists than formerly used have also been installed. The fact that about two tons is the



View of Quarry Showing Blasting House at Top. Shelter House at Bottom. Masts and Refuse Piles.

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Air Shovel Stripping and Loading Onto Skip.

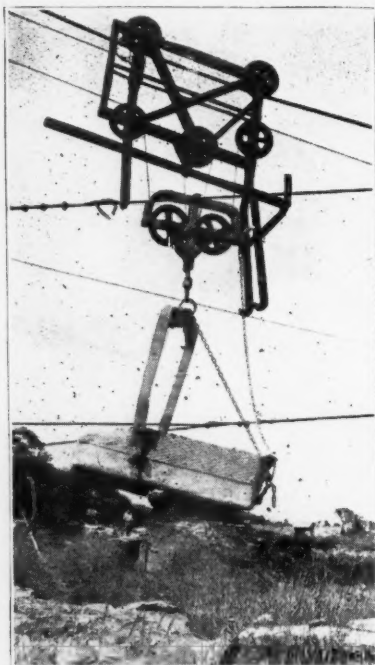
maximum weight which has to be handled, even with good material, because it has to be cut up anyway, greatly facilitates speeding up—a condition which does not apply to the marble and granite industry where large blocks of great weight are regularly handled. Special attention is given to the upkeep of all equipment. As Mr. Griffiths says, there is nothing which will so upset the production schedule and morale of the men as having trouble with machinery. In heavy quarry work such as this much care and foresight are required to accomplish this.

In regard to the handling of his men Mr. Griffiths has a liberal and sympathetic attitude. He will not tolerate autocratic foremen or loud and abusive language. He also makes it a rule never to criticize any of his men before others. The result is that he has an almost negligible labor turn-over and the best men in the industry for employees. He pays his help well and treats them in such a manner as to attract and hold the most desirable.

Two or three instances of the management methods followed in this organization are illuminating. For in-



Steam Shovel in Quarry; Mr. Griffiths at Right.



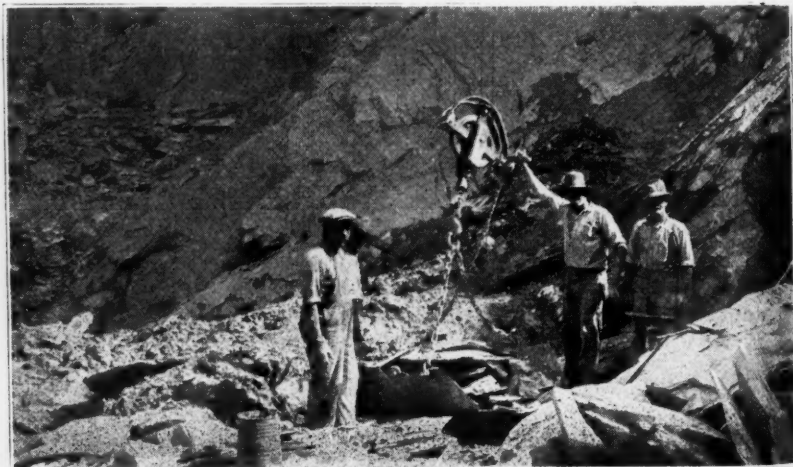
Tandem "Billy" Wheel and Carriage.

stance, when an air pipe line has to be changed new pipe is usually purchased and the old junked. This saves the cost of dismantling the old pipe which almost equals the cost of the new and it also avoids, by just so much, taking men from their regular work—a thing which they dislike and

which interrupts steady production. Also, while reasonable efforts are made to keep the place as neat as possible this is not carried too far because it costs a good deal of money and also takes men away from the work for which they are hired, frequently much to their disgust. These are both causes of possible labor turn-over which may be circumvented without "molly-coddling" or any loss of prestige by the management.

An inexpensive and effective measure which benefits both the laborer and the management has been the recent erection of a small shelter house at the bottom of the quarry. It is located as far away from the portion which is being worked as possible. Its window faces a wall of the quarry and is close to it. Thus it is a safe retreat during secondary blasting and saves time otherwise spent in getting entirely out of the quarry. It also acts as a shelter during the showers which occur frequently in these mountains. The men can keep right on working until the rain actually commences before starting for this nearby shelter, whereas otherwise they would naturally stop work much sooner when an approaching storm was observed and which might very possibly finally go off in another direction. In winter a stove is to be placed in this building so that it will be a comfortable place to eat lunch. This small house seems to be a wise detail of personal management.

Great precautions are also taken to avoid accidents and in this quarry one



Single "Billy" Wheel for Simultaneous Horizontal and Vertical Travel

of the most dangerous things to guard against are clay slides in the Spring. To guard against this the top surface, consisting of a 30 foot thickness of clay is kept sloped back at a low angle. It is a precaution which in this instance was taken by profiting by the misfortune of a neighboring quarry—a result of keeping wide awake all the time.

Water flows in all the time and unless pumping is to be kept up night and day it is necessary to have a pump of large capacity which will quickly lower the water level when the quarry opens up in the morning. The latter is felt to be the most economical, partly because it saves the wages of a night man and partly because power is frequently shut off at night for repairs and maintenance work by the lighting company. A 300 gallon Gould centrifugal pump with 20 h.p. induction motor has been installed to care for this machine.

In the mill where the shingles are made, the cutting of the quarry block is done by saws because the direction of the grain of the slate is the same as that of the laminations, so that the large pieces cannot be broken up by cracking as is possible in some quarries.

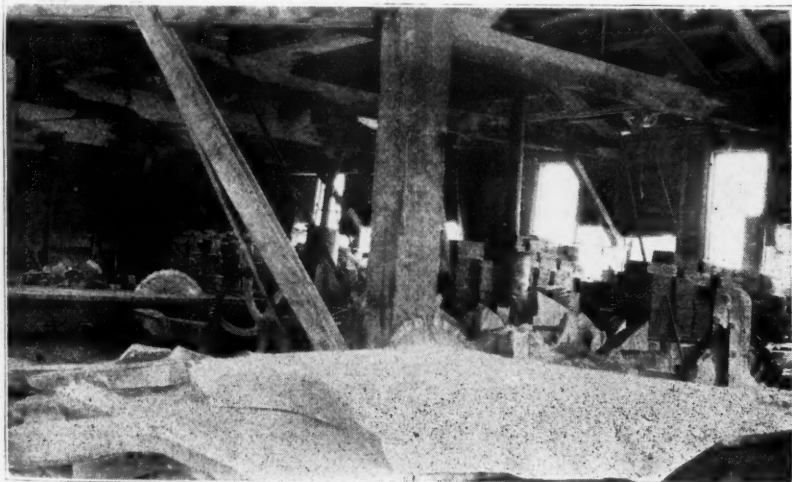
In splitting, trimming and drilling the men are divided into "gangs." Each gang consists of one man for each of these operations and is capable of turning out an average of five "squares" a day, (a "square" is sufficient shingles to cover 100 square feet of surface with the shingles over-



Removing Good Material After Small Blast.

lapping 3 inches, regardless of their size). At present there are five of these gangs and twenty-seven other men throughout the quarry to keep up this rate of production.

A rather ingenious labor saving device is a series of parallel rollers ex-



Mill; Saw in Front; Piles of Shingles on Rollers at Rear

tending through the building wall adjacent to which the various gangs are located. There is one of these for each gang. As the shingles are finished they are laid on boards resting on these rollers and when a board is filled it is pushed outside. Along the outside is a narrow gauge track for a small truck on to which the shingles are lifted by means of the board on the rollers. The tracks extend into the storage yard for finished products.

These same tracks are used to simplify the cleaning of the mill. Of course, a great many useless pieces of slate accumulate from the cutting, splitting and trimming operations. These are gathered up, placed in "skips" set on the trucks and pushed out into the storage yards. A cable way across this has been provided by means of which the "skip" is picked up and the refuse dropped on a conveniently situated dump.

Speed In Unloading

The value of speedy car unloading and short haul in reducing costs was recently demonstrated in Los Angeles, by the Livingston Rock and Gravel Company, on a road job, for which they delivered the materials.

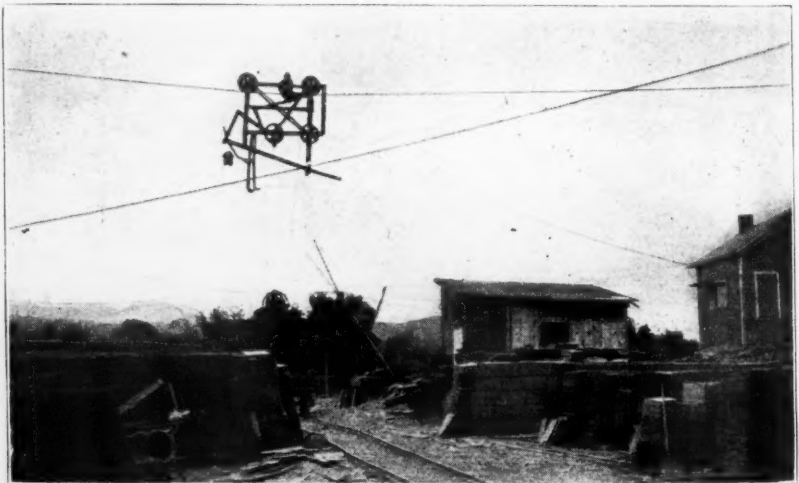
For the unloading work a motor truck mounted Universal crane was used. Its mobility enabled it to travel from one siding to another as the job moved along, and as car-load deliveries were correspondingly made, the haul never exceeded a quarter of

a mile. The materials were loaded directly into trucks and the trucks were loaded in from two to four minutes each. Occasional checks showed that often 9 bucket loads, or about 9 tons of material, were unloaded from car to truck in two minutes flat. On one day's work on the job the Universal unloaded eight car of 58 tons each in seven and a half hours. The materials were delivered on the grade by three 5-ton dump trucks. A setup of a Universal on jobs similar to the above are used successfully in many instances. The crane and trucks travel on the job together.

The manufacturers claim the Universal will travel any place you can drive your other trucks, and just as quickly.



The Universal Unloading on the Job.



Cableway Over Storage Yard.

Measurement of Accident Prevention by Compensation Insurance Rates

By Byron O. Pickard

District Engineer, Bureau of Mines, Berkeley, California

HAZARD is the general expression used by safety engineers to denote risk, or the danger to property or human beings from the contingencies peculiar to different industries. Where a business, family, or individual is subjected to possible financial loss from any particular hazard, it is customary and is considered good practice to insure for reimbursement of possible loss. Accordingly, we take out insurance for earthquakes, for fire, for accidents, etc., and are charged a different premium for each. The premium rate is based on our relative exposure to the hazard in comparison to the total loss to our particular class of business in our geographical location over a given period.

Insurance, then, must be considered as the experience of a group rather than of an individual, and any individual may be fortunate or unfortunate over stated periods. Through the law of averages, the probability of loss because of exposure to hazard is becoming more accurately measured as experience is accumulated and data are analyzed.

When human life came to have a financial value in the eyes of the law, and employers were held liable for losses through accidents to employees while on duty, insurance companies began to underwrite the accident risks of the different employers and divided them into classes based on the amount of risk involved. Premiums for compensation insurance are based on relative exposure, which is measured by pay roll. The premium is rated in proportion to the severity of losses established by statistical studies. It soon became evident that the accident experience of employers in the same industry varied widely; that is, there were good and bad risks in the same line of business. This resulted in "experience rating" of premiums, meaning thereby that an employer with experience in accident cost was premium rated in proportion to his losses over a stated period (usually three or more years).

Then it was determined that accidents could be prevented, and em-

ployers in certain industries were given the equivalent of credits for certain preventive work in proportion to the estimated value of each protective device or safety measure installed, and were similarly charged for all substandard conditions. It has required many years of accurate statistical study, by the insurance and other organizations concerned, to develop a relative value or factor for each preventive measure in each industry.

The Bureau of Mines cooperated with insurance companies in developing the first merit or schedule ratings for accident insurance premiums in coal mines. This first schedule was largely theoretical, as it was based on incomplete statistics of fatal accidents, but several years of experience have developed a workable schedule for merit rating of accident insurance premiums, which has resulted in a large saving in compensation insurance premiums for the many mining companies that took advantage of this opportunity to reduce ratings by complying with the standard protective measures.

Where schedule rating is used in the coal-mining industry, the largest individual credit is given for a safety organization, education and inspection service, as statistics based on the law of averages in that industry show that a large percentage of the accidents can be prevented through systematic effort. There is no doubt that this is true in other industries.

Accidents cost money, in fact, their total cost is far in excess of the first casual thought. The main purpose of this article is to point out this cost, using compensation for accidents as a basis, in order that safety engineers may show the saving effected through accident prevention. To take the money cost as a measurement for the safety engineer to use in influencing the mine management to consider accident prevention, may be considered by some as rather cold-blooded, but in every industry there are executives who must be faced with measurements other than sentimental, for they measure their value by their ability

to reduce costs. Nor do executives have a monopoly on cold-bloodedness, for there generally are in every organization many workmen who do not see that accidents cost them money. But the total cost of accidents as measured by accident insurance will furnish much ammunition for the safety engineer who uses comparative results before and after active safety work over definite periods.

Industrial accidents may be considered as comprising two groups: (1) Those that cause injury to men; (2) those that do not result in injury to men. Both of these groups may be included under the general term "production" accidents, while those that result in injury to men may be referred to specifically as "human" accidents.

An industrial human accident is always a production accident, and generally is a production accident that has occurred numerous times before an employee was actually involved. Therefore, there should be added to the human accident cost, the delays caused by the production accident. In computing total accident cost, the safety engineer should call in the aid of the efficiency engineer, who by taking a little time and thought may ascertain within reasonable accuracy, the frequency measurement and resultant time cost of the production accident represented by the human accident.

Workmen's compensation insurance or compensation paid as a result of human accidents is a true operating cost and is the only purely tangible measure available which gives a relative measurement of the cost of accidents even though, as will be pointed out later, it represents but a portion of the total cost of accidents to employees. When we use compensation insurance premiums as a measure of the cost of accidents, it must be kept in mind that most insurance laws provide a waiting period before compensation for lost time wages starts, with the compensation limited to definite percentages of the wages. The waiting period and limited compensation combined tend to limit the amount paid to the injured workman, who, if he receives one-third of the lost time wage, will probably have been reimbursed as high as the average injured workman.

The total or complete economic cost of human accidents must include:

a—Premiums paid for compensation

insurance to cover compensation paid for lost time and cost of hospital and medical attendance.

b—The portion of the lost time wage suffered by the workman for which he is not compensated.

c—The lost time and delayed production caused by the numerous occurrences of the production accident, represented by the human accident.

d—The lost time and the temporary decreased production resulting from the breaking down of the morale, etc. (especially large if the accident results in a fatality).

e—The lost time and delayed production resulting from the breaking in of a new employee.

f—The increased liability of human and production accidents happening to or caused by the new employee.

g—The economic loss through the killing of a workman who has no dependents. Few state laws require any compensation except burial expenses to be paid for fatalities to persons having no dependents.

h—Incomplete compensation for fatalities. It is estimated by the U. S. Bureau of Labor statistics that the economic loss through a fatality is 6,000 shifts. If each fatality was compensated for this amount of time at one-half time wages, using an average wage of \$5 per shift, the compensation for fatality based on the economic loss would be \$15,000, but the average actual compensation paid for each fatality is about \$3,000.

It has been stated by the late E. H. Downey, one of the best known authorities on accident prevention, "On any reasonable estimate of wage loss, the benefits payable under the Pennsylvania Compensation Act of 1919 will amount to not more than 20 per cent of the economic cost of industrial accidents, to say nothing of occupational diseases."

Taking Downey's estimate as a basis and considering Pennsylvania as an average State, it is reasonable to assume that the cost of human accidents in industry is as great as, if not greater than five times the amount paid out in compensation for lost time wages if the several factors, noted previously, are considered in the cost.

During 1924, I carried on, under the Bureau of Mines, a study of compensation insurance in fifteen important metal-mining States, in order to apply it to certain conditions existing in the mining industry, and prepared a

series of short papers dealing with the subject, published by the Bureau of Mines. There were many lessons learned in this study. For example, the study led me to determine that:

(1) Accidents are prevented consistently only when there is a well organized safety department with careful and regular inspection.

(2) There is a predominance of self-insurers among metal-mining companies, due to a desire of the companies to lessen their accident insurance cost.

The self-insurers found that in order to lessen the cost, they must carry on an active, persistent campaign to decrease their accident frequency and severity. In order to arrive at a comparative estimate of the cost of compensation insurance as affecting underground metal mine operations, I obtained data directly from three to twenty operators in each of thirteen States, and herewith recapitulate in table form the average premium charges, using the relative average premium rates paid by companies rather than on a total combined payroll.

With the exception of the self-insurers, the rates charged individuals by carriers are based on the annual rates in effect during the normal year, together with the credits or extra charges given the individual operator through experience rating in such States as permit experience rating.

For example, in one State the present manual rate is about \$6, but a single individual operator's rate has recently been increased to nearly \$31 through bad experience over a term of years.

As stated, the table given below is based on actual premiums paid by individual operators.

This table offers a variety of costs as would be expected when the variables are considered. Four especially important factors should be considered, namely:

1. Compensation for accidents represents an important part in the production cost.

2. Self-insurers through accident prevention, and including the cost of accident prevention plus insurance and legal departments, have cut their accident costs and reduced their production costs thereby.

3. There is a definite relationship between the cost of accidents and exposure to hazards.

4. The different states listed, through variable compensation laws and variable inspection service, show much difference in the cost of accidents.

I am forced to conclude from this field study and an analysis of accident insurance costs that metal mining, in spite of public opinion to the contrary, is not an extraordinarily poor risk if preventive measures be enforced or an incentive offered to decrease accident frequency and severity, and that

TABLE I

Average Premium Rates of Reporting Metal Mining Companies for a Recent Normal Year

Average Premium Rate per \$100 of Underground Payroll of Each Company

State	Self-Insurers ^a	Stock Ins.Co's ^b	State Fund ^b	Mutual	Reciprocal
Alabama	\$ 2.00	\$ 3.00	\$	\$	\$
Arizona	3.87	7.15	....	....	....
California	3.00	5.75	4.60	....	....
Colorado	1.00	3.50	2.75	....	....
Idaho	2.08	....	....	....	....
Kansas .....	....	4.67	....	6.76	5.21
Michigan	2.85	2.92	....	....	....
Minnesota	1.57	3.00	....	....	....
Montana	1.30	....	1.75	....	....
Nevada .....	....	....	2.50	....	....
Oklahoma .....	....	4.04	....	5.16	....
Utah	2.76	3.72	....	....	....
Wisconsin (zinc) .....	....	10.28	....	....	....

a. The "premium" charged by self-insurers is charged against the business, and corresponds to the premium paid when insured in an independent insurance organization.

b. It should be remembered, in connection with this table, that the rate charged by State Fund and Stock Insurance Companies carries an overhead charge of about 40 per cent, as was explained in Serial 2607 previously noted.

accident cost in any industry is inversely measured by preventive work.

If we should multiply each foregoing premium rate by five, to more nearly represent the total economic loss rate per \$100 of payroll, the proportionate saving of the self-insurer, whom we may consider as being especially and selfishly active in accident prevention, is very convincing.

Can any employer afford not to do all possible to prevent accidents to his employees when he is contributing to the world's economic loss to an extent equivalent in value to five or more times the amount he is paying out annually in premiums for accident insurance?

By the same reasoning, can an employee afford not to cooperate to the fullest extent by doing his big part in accident elimination when the workers as a whole receive only about one-third of the actual wage loss? The worker has it in his power to save himself and family a large share of his wages through working safely.

But by the expenditure of a comparatively small amount in statistical analyses, the causes of accidents can be determined and an intelligent study by a competent safety engineer will develop relatively inexpensive preventives for the larger portion.—Reports of Investigations, Bureau of Mines, Department of Commerce.

Lipe Speed Reducers

Because of the wide application of speed reducers in the non-metallic field the recent circular of W. C. Lipe, Inc., describing their product in this line undoubtedly will be of interest to many producers. The Lipe speed reducer is manufactured under the Tyler patents and is of full planetary construction using two or three planets, depending on the service required. It is mounted in a cage supported on both ends by ball bearings. The studs on which the planetary gears rotate are supported in both ends of this cage, the gears being bronze bushed.

The low speed shaft is connected with the cage by means of a flexible connection mounted in the end flange of the planetary gear cage. The high and low speed shafts are concentric and in perfect axial alignment. The pinion on the high speed shaft floats and equalizes the load between the planetary gears. The rotating members are totally enclosed thus making them dust proof and fool proof.

New Incorporations

The Lincoln Gravel Company, Star City, Ark.; capital, \$10,000. Incorporators: M. E. Sherland, A. J. Johnson, Clyde E. Fish and Jim McClellan.

Madison Sand and Gravel Corp., Hamilton, N. Y.; 2250 to 2750 shares, of which 750 are \$100 each, 2,000 common, no par.

Flushing Sand & Gravel Co., Flushing, N. Y.; capital, \$25,000. H. W. Alden, H. M. O'Connor, incorporators; C. S. Golden, attorney.

Perrin Hampton Springs Sand Co., Chicago, Ill.; capital, \$1,200,000. (Corporation Maintenance and Service Co.)

Galassi Company, Boston, Mass. (building materials); capital, \$100,000. Incorporators: Elias Galassi and Francis L. Galassi, both of Winthrop, and Joseph F. Doherty, Dorchester, Mass.

Penfield Stone Corporation, Rochester, N. Y., 500 shares, \$100 each, 1,000 common, no par. H. D. Hutcheson, C. J. Stolbrand, E. H. Schaufelberger, incorporators. (Atty., J. M. E. O'Grady, Rochester.)

New-Way Gasoline Engine

A new single cylinder, air cooled gasoline engine of 8 h.p. is being introduced by the New-Way Motor Company. The manufacturers claim that the fact it is only one cylinder gives it an advantage over the multi-cylinder engines in simplicity, strength, balance and endurance.

The distance between the main bearing is only 4½ inches which it is said gives an advantage in strength for heavy duty work. It is also claimed that a single cylinder works with less vibration than a two, where the pistons must travel side by side to rotate the cycles, and that the single cylinder, governed automatically, carries an overload which will stop two cylinders.

The complete New-Way engine weighs only 300 pounds. It has a 4½ inch bore by 5½ inch stroke and is rated at 800 to 1200 r.p.m. The engine is also supplied with power take off at half crank shaft speed. It runs on gasoline, alcohol, benzine, distillates, kerosene, or gas.

The crankshaft can be removed without disturbing the ignition, governor, valves or gears which are so placed that they also are easily accessible. The connecting rod bearing can be adjusted in five minutes.

Putting Swedeland Slag on the Market from Grit to Ballast

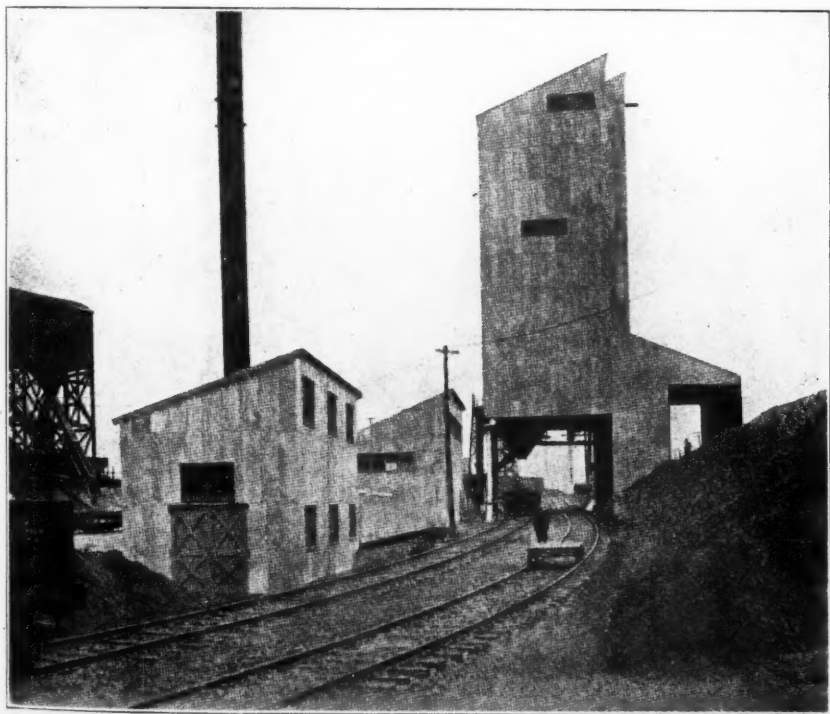
SLAG, a by-product of the blast furnace, results from the combination of the silicious and other mineral substances contained in ore, with the limestone or other fluxes added, varying in character according to the ores and fluxes used in the furnace. After having withdrawn the reduced metal, the slag, in its molten form, is taken from the furnace in heavy iron cars built for that purpose and dumped.

For a long time this material was regarded as a worthless by-product of the blast furnace. The recent rapid development of concrete masonry inspired the Philadelphia Slag Company to experiment with slag as a substitute for stone, to be used as a filler. Test cubes were prepared according to the usual formulae followed by engineers, with the result that concrete made with slag as a filler was found to possess all the

merit, as to crushing strength, durability and imperviousness to weather conditions, found in concrete made of limestone.

A cubic yard of Swedeland slag (the product of the Philadelphia Slag Company) will average two thousand pounds. The slightly porous formation peculiar to this material causes the cement and sand, when reduced to the proper fluid consistency by the admixture of water to adhere firmly to the slag, with the result that when the whole mass has set, a compact body is formed which does not yield or disintegrate.

In the construction of the Atlas Portland Cement Work, at Northampton, Pennsylvania, (one of the largest in the world) approximately 150,000 tons of Swedeland slag was used extending over a period of eight years. The slag entered into the construction of all kinds of concrete masonry,



The Boiler, Tank House and Main Plant.

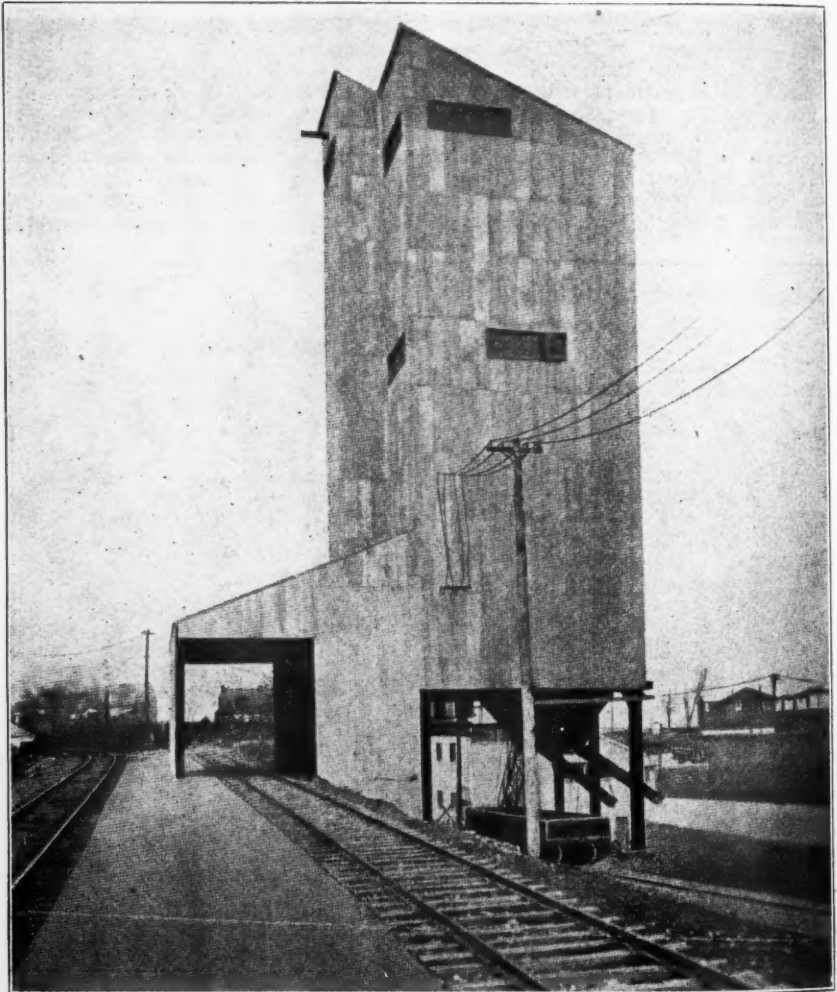
from the heaviest building and machinery foundations to the six inch reinforced concrete floors.

At the present time there are about thirty-two slag plants in operation throughout the United States. The capacities of the different plants range from three hundred to four thousand tons per day.

The Philadelphia Slag Company, operating on the property of the Alan Wood Iron and Steel Company, at Swedeland, Montgomery County, Pennsylvania, has two plants, with a daily output of three thousand tons. The Iron Company takes the molten slag in 15 ton ladles to the slag bank, which is kept at a height of about

forty to fifty feet, so that the digging can be done with hundred ton Marion steam shovels. Drilling six inch holes with a Sanderson cyclone drill 25 to 30 feet deep, spaced according to the way the slag is formed, and shooting one hole at a time as the shovel works toward the bank, saves considerable wear on the shovels.

The slag is loaded in battleship cars and transported to the crushing plants by the Philadelphia Slag Company's own locomotives. The Philadelphia Slag Company's plants are known as number 1 and number 2. Number 1 plant originally was built in 1909 and since that time the capacity has been increased by installing larger and



The Swedeland Plant.

heavier machinery. In this plant they have one set of 36x24 inch Traylor rolls for primary crushing and a 36x18 inch Traylor roll for secondary crushing. The slag is elevated in chain bucket elevators to a magnetic separator and then passes through four revolving screens which separate and deposit the different sizes in bins which hold approximately 600 tons. Each bin holds one hundred tons of the six different sizes which are sand, roofing, $\frac{5}{8}$, $\frac{3}{4}$, $1\frac{1}{2}$ inch and ballast. This plant has a capacity of 1200 tons and is for railroad car shipment only, due to its location, as trucks cannot get to it.

Plant number 2 was built in 1924 and has a capacity of 1800 tons and is located so that car shipments and trucks can be taken care of. This plant is a combined crushing and mixing plant and is one of the most modern of its kind in the world. The building is 114 feet high and contains

seven slag bins with a total capacity of 700 tons and two bins with a capacity of 65 tons each for a slag asphalt mix marketed by the Philadelphia Slag Company under the trade name of Buckite.

Dolomite slag has been used in England as a mineral aggregate for road building material for many years. After extensive research from both this and other countries, a test mix of Swedeland slag and a high grade asphalt was made. Other test mixes followed and the material was laid in such localities as to afford diversified conditions of service. Records were kept as to the durability, costs, etc. These investigations led to the building of plant number two at a cost of \$300,000, for the manufacture of a mix to be marketed under the trade name of Buckite.

This Buckite is clean crushed Swedeland dolomite slag mixed with a high grade asphalt so as to thoroughly coat



Note the High Track Where the Slag Is Dumped Into the Crusher Hopper

each particle so that after the mix is rolled it will be a solid mass with the particles permanently bound together. It is made to be water, frost and climatic temperature proof.

At plant number 2 there are installed two mammoth crushing rolls of Traylor manufacture. The slag is elevated with buckets mounted on manganese steel chain to the top of the plant, where it is taken over a conveyor belt through a magnetic separator which reclaims whatever iron is left in the slag when taken from the furnace. The slag is distributed through a series of four tandem single face decked electric vibrating Hummer screens, which produces the proper and clean sizes. The sizes produced are the same as at plant number 1.

The company has also installed one large Traylor roll for secondary crushing and a Kennedy Van-Saun ball mill with a capacity of 50 tons per hour to make slag grit used extensively in the manufacture of concrete block and brick. Shipments are made over the Reading or Pennsylvania Railroad.

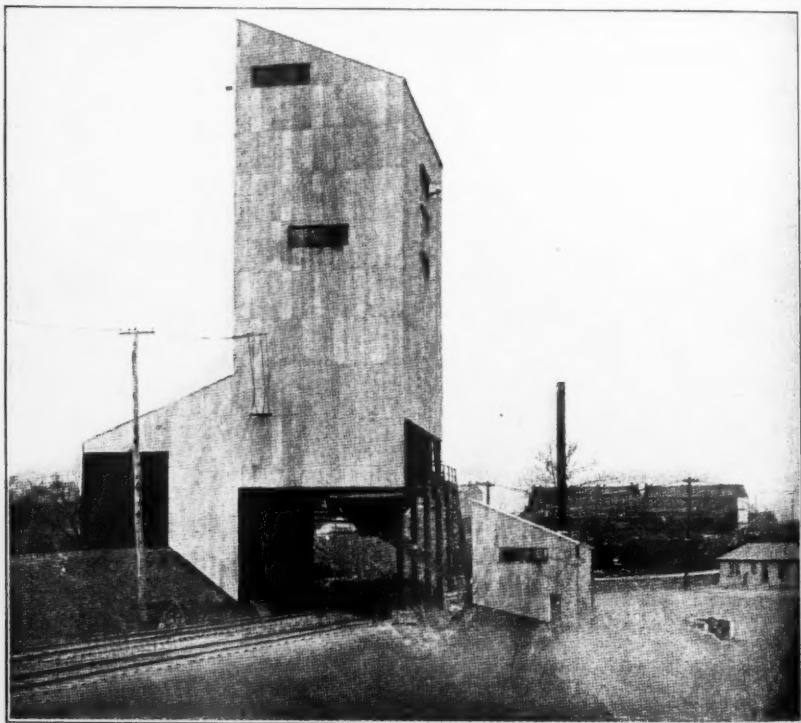
The personnel of the Philadelphia

Slag Company includes William S. Buckland, Owner and General Manager; A. I. Burkholder, Accountant; Robert F. Peters, General Superintendent; George W. Weiss, Consulting Engineer; Norman L. Forte, Sales Manager.

Mundy Appointments

W. Fred Casey Company, 205 West First street, Charlotte, North Carolina, has been appointed by the Mundy Sales Corporation as exclusive distributor for the Mundy line of steam, electric and gasoline hoists in the state of North Carolina. Yancy Brothers of 550 Whitehall street, Atlanta, Ga., has just been named exclusive distributor for the Mundy line in Alabama, Georgia, South Carolina and the extreme western part of Florida.

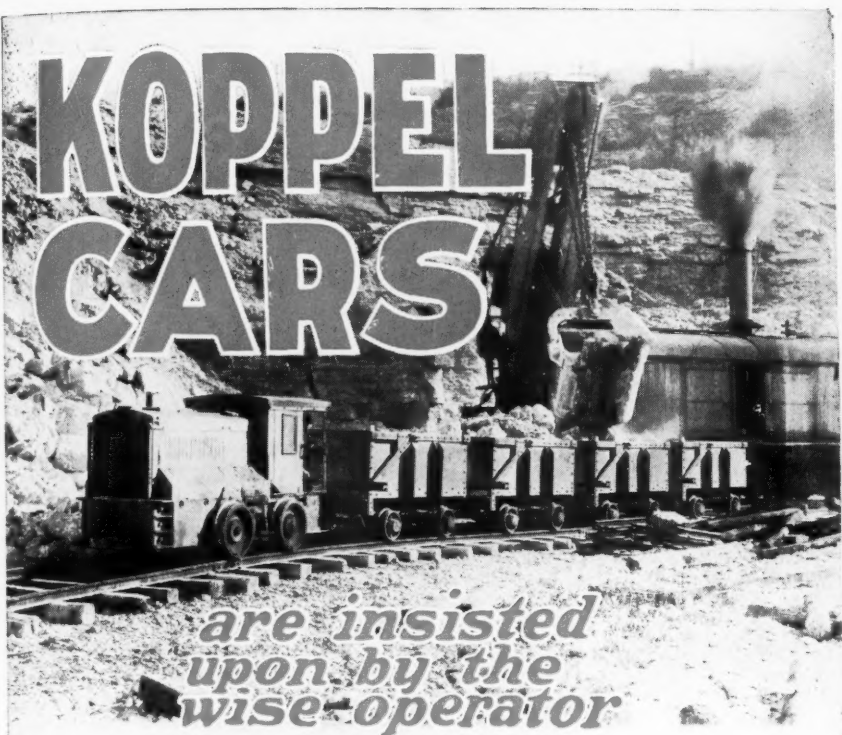
Earnest Brothers of Richmond, Virginia, have been given the Virginia territory and Franklin Taylor, 411 Citizens Bank building, West Palm Beach, Florida, has obtained the exclusive distributorship in the counties of St. Lucie, Martin and Palm Beach, Florida.



Note the Excellent Facilities for Quick Loading of Cars or Trucks

*pages missing
see above*

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The DC is a crane, shovel and dragline all in one and it gives maximum efficiency in each service. As a crane,—hook and block, clamshell bucket, wood grapple, magnet or pile driving attachments may be applied, all of which greatly augment its serviceability.

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Novel Producing and Marketing Methods Applied to Sand and Gravel Business

INDIANAPOLIS is not only an important center for the production of sand and gravel but is an interesting one as well. It is here we find the Granite Sand and Gravel Company centering its activities. This company operates several efficient plants and has adopted unusual methods both in the production and the marketing of its product.

The company started in a modest way in 1914 with a one cubic yard Sauerman cableway and a small screening plant. In the years that followed, rapid progress has been made. The original plant was enlarged several times, and the operating units were also increased in size. The Granite Sand and Gravel Company operates three plants near Indianapolis and a fourth at Morristown, Indiana. The production details are interesting at all of these plants, and the marketing methods are of special interest in Indianapolis.

The plant at Morristown is a washing, screening and crushing plant located on the Indianapolis and Cincinnati Traction Line, twenty-five miles southeast of Indianapolis. This plant is situated in about the center of a 23 acre tract, one half of which has been exhausted.

The deposit extends from 15 feet to 20 or 25 feet below the water level.

The overburden of earth is about 3½ feet in depth, which is removed with teams and slip scoops. The material runs about 40 per cent above the quarter inch size. The gravel is removed from the deposit with a Sauerman 1 cubic yard bucket operating on a Sauerman slackline cableway of 650 foot span. A 1¾ inch trackline is anchored to a bridle hitch on the back side and to a pair of triple blocks, attached to the top of an 80 foot hickory mast at the plant.

The bucket dumps the gravel into a receiving hopper through a set of grizzly bars spaced on 4 inch centers and set on a 45 degree slope which rejects the oversize boulders onto a waste pile. A gate in the bottom of the hopper feeds the gravel into a Stocker (patent) rotary, water drum washer. Clean water forced in at the gravel discharge end causes the dirty water and sticks, if any, to be washed out at the feed end of the washer from where it is carried off through a waste trough. The washing drum is 5½ feet in circumference and 12 feet in length. Longitudinal vanes, on the shell of the washer, lift the gravel out of the washer as the drum rotates and drop it into the water again as each vane passes the top of the circumference. The gravel falls on a series of stationary conveyor



The Pit Operated By the Single Unit Cableway; Plant at Indianapolis

pans set on a 30 degree angle longitudinally through the center of the drum. Each conveyor pan moves the gravel toward the discharge end about 18 inches. It is washed eight times on its journey through the washer.

The gravel discharged onto a circular screen, which is attached to and revolves with the washer. Surrounding the gravel screen is a sand screen with $\frac{1}{4}$ inch round openings. A 2 inch stream of water forced through a series of small nozzles completes the washing of the gravel and separates the sand from the coarse aggregate. The screened gravel falls into one bin, and the sand runs through a chute into another bin. When a finer sand is desired for plastering or brick work, the sand is re-screened over a gravity screen. A water jet forces the fine sand through the screen into a settling tank and washes the coarse sand off the screen into another chute.

The oversize gravel, which does not pass through the screens, automat-

ically feeds into a TelSmith jaw crusher placed at the mouth of the screen. The crushed gravel falls into the bin with the screened gravel. By means of a system of chutes and troughs, the sand and gravel may be mixed in any desired proportion and run into any one of the three bins into which the storage portion of the plant is divided.

The bins are of timber construction with center bottom discharge. The plant is constructed over the switch track and the empty cars backed under the various bins for loading. The gravel is shipped in 12 and 16 cubic yard Western side dump cars. The capacity of the plant is approximately 250 cubic yards per day. The large percentage of the output is sold for road construction and maintenance purposes. Some gravel is trucked from the plant, but most of it is shipped on the traction line. As this line intersects highways at about one mile intervals, delivery may be made close to the point where the



The Two-Unit Plant at Indianapolis

material is to be used, and team or truck haul is reduced to a minimum.

Electricity is used for power. It is 3 phase, 60 cycle, 440 volts A. C. which is stepped down from 33,000 volts by a set of transformers on the location. A 75 h.p. motor runs the Thomas belt driven hoist. All the water for the plant is furnished from a 45 foot driven well. It is delivered by a 5 inch American centrifugal pump operated by a 25 h.p. General Electric motor. A 20 h.p. motor drives the Stocker washer, and another motor of the same size furnishes power for the crusher. All plant motors are General Electric.

In 1925 a portable steel barge with a 10 inch Amsco centrifugal pump was used to reclaim the gravel from the remote sections of the lake. The pipe line discharged the gravel near the plant, in reach of the Sauerman cableway, so that it could be reclaimed by the bucket. The pump is equipped with a 40 foot Swintek traveling suction screen. Power for the barge is furnished by a 200 h.p. Allis Chalmers motor.

C. E. Jefferson, of Indianapolis is manager and John H. Jefferson of Morristown, superintendent of the Morristown plant.

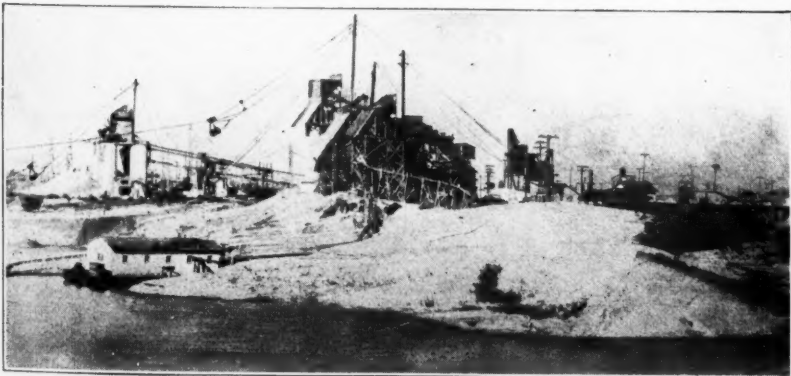
The operations near Indianapolis are quite unusual both from a production and a market standpoint. Operations are carried on practically all year. An arrangement has been made with several manufacturers of concrete products so that the Granite Sand and Gravel Company furnishes the aggregates. These concrete products plants are close to the Granite Sand and Gravel Company's operations making delivery an easy matter. Another market factor is cared for

by the Emulsified Asphalt Company who erected a plant adjacent to that of the Granite Sand and Gravel Company and to whom a large tonnage of sand is sold. The sand is conveyed from the Granite bins to the Emulsified plant by belt conveyors. For coarse aggregate the Emulsified Asphalt Company crushes and screens the gravel securing a granite product.

An excellent market for highway and construction aggregate exists in and around Indianapolis which the Granite Sand and Gravel Company serves by truck. A fleet of 16 5-ton Mack and Pierce Arrow trucks is owned and operated for this work.

The plants at Indianapolis operate from the same deposit. This is a flat deposit with an average of three feet of overburden. The deposit extends about 20 feet above to about 40 feet below the water level. This deposit is worked by really three plants. Two of them function as one since two cableways operate side by side discharging into adjacent hoppers. These cableways are 1½ and 2 yard capacity. This condition resulted from the necessity of increasing the capacity quickly to meet a rapid rise in the demand. The third plant is an unusually efficient cableway plant.

This deposit is worked in a most interesting manner. The material is excavated by a suction dredge and transported by barge to an underwater storage pile and reclaimed by the Sauerman cableways which discharge to the hoppers feeding the screens. There is no stripping as the material is excavated and washed first when it is pumped into the barge, a second time when it is dropped into underwater storage and a third time when it passes through the screens.



The Two Plants at Indianapolis



An End View of the Morristown Plant

The dredge, which has a 70x20 foot hull, is equipped with a 12 inch Amsco pump direct connected to a 150 h.p. General Electric motor. A Swintek travelling suction screen is used. Barges are loaded first on one side of the dredge and then on the other. The discharge pipe comes up to about 10 feet above the deck of the dredge and branch pipes equipped with flap valves deliver the material to the side desired. Two barges are sufficient.

One is being loaded while the other is delivering its load and returning.

Each of these barges has a 70x30 foot hull divided into 7 compartments by bulkheads between each of which is a hopper with a bottom discharge. Air spaces on either side of the hopper provide buoyance. A five inch pipe set in bearings on top of the bulkhead is turned by gears, and this winds a chain around the pipe as it is turned. The chain around the pipe is connected with another chain to the doors to the hoppers, and as a result of this winding all the doors are closed. A latch holds the pipe from turning when the doors are closed, and the boat may be discharged by releasing this latch. With the latch out the weight of material is sufficient to unwind the chain and open the doors to the hoppers. A barge can be discharged in less than a minute.

Two Fordson engines, each of which is connected by chain drive to an 8x5 foot paddle wheel, move the barges. Each engine and its wheel is an independent unit. A rudder is not necessary as the barge can be steered by running the paddle wheels forward or reverse as desired. Each barge has a capacity of 125 tons. One man is required on each barge and one on the dredge. The barges discharge underwater to the storage pile. This underwater storage system permits continuous operation even in winter and storage is reclaimed economically by the Sauerman cableways.

The two unit cableway plant is operated by a 90 h.p. Sauerman hoist. One bucket is a 1½ yard Sauerman



Ballast Train Leaving the Morristown Plant



A Bucket Load and Plant Employees at Morristown

while the other is a yard Sauerman. The buckets discharge into hoppers through a bar grizzly. From the hoppers the material is delivered by spouts either to a Webster revolving screen or to a set of gravity screens. The oversize material passes to a number 9 Fort Wayne jaw crusher from which the material is taken to the gravel bins by conveyor. The Webster revolving screen has 2, 1½, ¾, ½, and ¼ inch openings. The gravity screens consist of three screens. The first is a 1½ inch slot screen, the second is a 1½ round hole screen which takes the oversize from the first screen while the third screen is a ¼ inch which takes the undersize. The material passing the ¼ inch

screen passes to a Link Belt "Dull" dewatering cone. The gravity screens are located above concrete silos.

The third plant or the single unit is operated as a regular cableway unit and has 6 concrete silos each 50 feet in height and 14 feet in diameter arranged in two rows with a space of 16 feet between the rows which is covered. The silos form a rigid support for the cableway mast of which is located in the center of one of the rows.

The incoming load is discharged to a hopper below which are the gravity screens and crusher. The gravity screening system is the same as that described for the two unit plant. The sand is, however, passed to two Dull



Close Up of Front End of Barge at Morristown. Note Barge Floating on Steel Tanks

dewatering cones. This third plant was installed to open up a new pit and is a regular slackline cableway operation digging and conveying by a Sauerman 2 yard unit. The output is principally asphalt sand which lies in deep strata under the coarser sand and gravel. Water for washing in both plants is supplied by De Laval 8 inch centrifugal pumps direct connected to a 50 h.p. General Electric motor. A 5 inch American deep well pump direct connected to a 25 h.p. General Electric motor is maintained as an auxiliary unit.

The officers of the Granite Sand and Gravel Company include W. K. Miller, president; J. F. Barnhill, vice-president; F. D. Stilz, secretary-treasurer and G. V. Miller, manager.

Bulk Materials Storage

"Storage of Bulk Materials with Power Scrapers" an attractive illustrated booklet dealing with the many and varied problems of storing and reclaiming which confront practically all operators in the non-metallic field, has just been issued by Sauerman Brothers, Inc., manufacturers of slackline cableway excavators and power drag line scrapers.

The booklet lists as the advantages of the power scraper, its simplicity, flexibility and dependability. It points out that unless equipment will, without fail, day in and day out, handle the required amount of material efficiently and at low cost its purpose is defeated and it is of little or no value.

In a field so highly competitive as the sand and gravel and crushed stone industries it is essential that production and rehandling costs should be reduced to the minimum. As these are largely dependent on the cost of the equipment, as well as operation, equipment must be so simple that no expensive structures are necessary. There should be no complicated and costly mechanism and no great power, maintenance or labor expense.

No regular storage area of a certain size or shape is required for a drag line scraper; usually any vacant ground adjacent to the plant can be used. It can also be used for indoor storage to good advantage. After an initial pile has been formed by elevating or conveying equipment or by spouting from bins, or dumping from cars, the scraper drags the material away distributing it in piles of any height desired.

Where space permits the storage

pile is generally formed by operating the scraper on a single line creating a long high pile with the material taking its natural slope. Frequently, however the shape and dimensions of the area are so restricted that more than one line of operation is necessary. That is to say, the scraper is forced to work in successive lines radiating from the initial pile. For reclaiming the scraper is turned around. Generally, though not necessarily, the place where the initial point is formed is the same as the reclaiming point. In many cases the scraper drags the material up an incline dumping through a hopper or trap to cars or tracks.

The book is filled with instructive diagrams and illustrations of actual installations.

Improvements In Signal Mountain Cement Plant During 1925

More than \$500,000 was spent during 1925 by the Signal Mountain Portland Cement Company, Chattanooga, Tennessee, in increasing its annual production capacity from 1,000,000 to 1,500,000 barrels. The new equipment included one 11x175 foot rotary kiln, with an accompanying rotary cooler 8x70 feet. Two new Allis-Chalmers compeb mills were installed in the raw department and two similar installations were made in the finished department. All four of these mills were 7 feet in diameter by 36 feet in length, and are operated by 500-h.p. synchronous motors.

One number 6 Williams mill was also installed in the crushing department. This mill is served by a new 60 foot rock elevator from the crusher.

Improvements during 1925 also included the extension of the main storage building 100 feet in length, increasing the capacity of the raw material storage by 15 per cent. A new set of six silos for cement storage was also constructed, increasing the storage capacity by 100,000 barrels. A Fuller-Kinyon system was installed for conveying the finished cement.

Extensive developments were also conducted in the quarry. Several new quarry cars and other equipment were added.

Other improvements included a new office building at the plant site, garage and oil and motor repair storage. The new improvements in construction were made by the Cowham Engineering Company of Chicago, operators of the plant.

Material Handling and Waste Disposal Solved By An Ingenious Method

By George Ransom

RECORDS show that the Eureka Slate Quarry of Fair Haven, Vermont, was in operation at least seventy five years ago and there is reason to believe it started a great deal earlier. R. Temple Jones, the superintendent, has been in charge for thirty-six years and as things go in Vermont this is not much more than a good beginning.

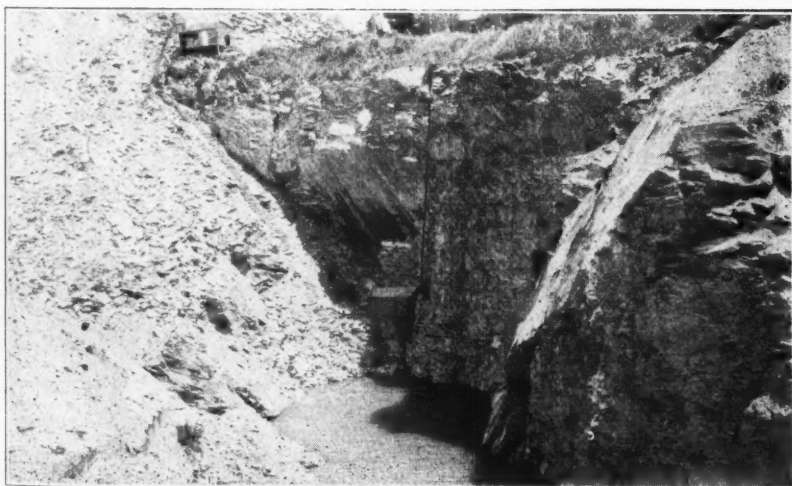
At present there are two separate quarries—one large and one small. The product is a fine grade of roofing slate of several colors. The stratification of colors occurs in the following order—mottled green, purple, mottled purple, dark green, light green, still lighter green, gray green, flint, spotted green.

Slate has been taken out to a depth of 225 feet in some places and the end was not reached, but it hardly paid to go any deeper. The layers have a slant of 45 degrees, which until very recent quarrying was from east to west. Latterly, however, a post was reached where the declination was from south to north. There is a large amount of poor material overlying the good at the point where this change occurs. The method by which Mr. Jones intends to dispose of this waste is interesting and ingenious.

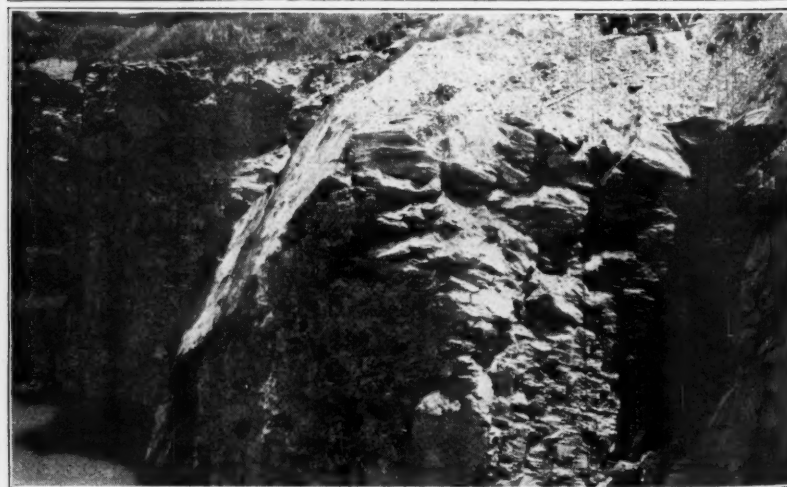
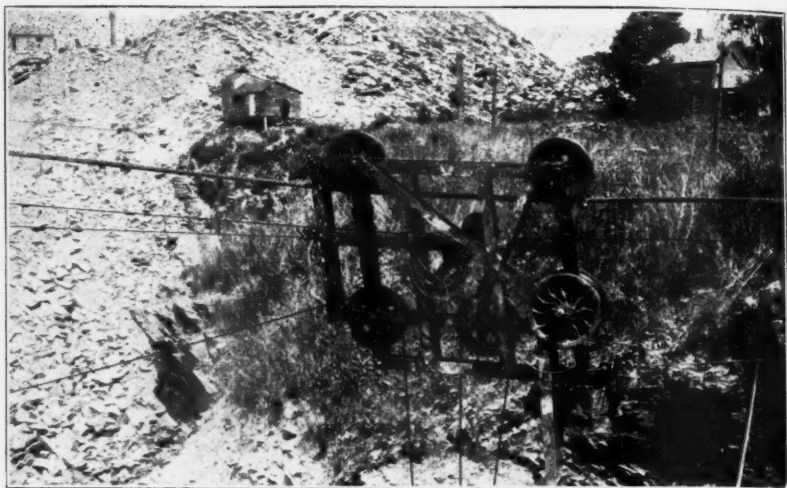
First, all good stock is being taken out as far down as conditions warrant. Then a butt line 45 feet long was laid out parallel to the flat surface of poor material as shown in the illustrations and about 50 feet back from the edge. A series of 25 or 26 holes, 50 feet deep, are being drilled with a Loomis well drill. When the blast is fired a large amount of stone will be tumbled over into the bottom of the worked out portion of the quarry and it will be an easy matter to push over the rest of the loosened rock. After this the workable stock will be exposed.

This method of filling in the worked out parts of the quarry with refuse from advancing operations has been followed in so far as practicable for a great many years and most of the buildings shown in the various photographs have been erected on filled in spaces. It works very well in an old quarry of this kind but of course would not be practicable in a new one where there is as yet insufficient worked out space.

In stripping for new work the top ten feet, consisting of clay, are taken off by first loosening by blasting and then shoveling by hand into aerial carriers. The soil is then carried off



Waste Material Dumped Into Worked Out Part of Quarry



Above, Carriage and Cable Way. Middle, Storage Yard for Slate. Below, View of Quarry Showing Formation.

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and dumped into a worked out portion of the quarry. There is usually about 10 feet of hard pan below the clay and directly over the slate. This is left in place as tamping and the drilling is done through it into the slate. The illustrations give an idea of the character of the top covering. Black powder is used exclusively for blasting as it loosens the slate in chunks, whereas dynamite would shatter it entirely too much.

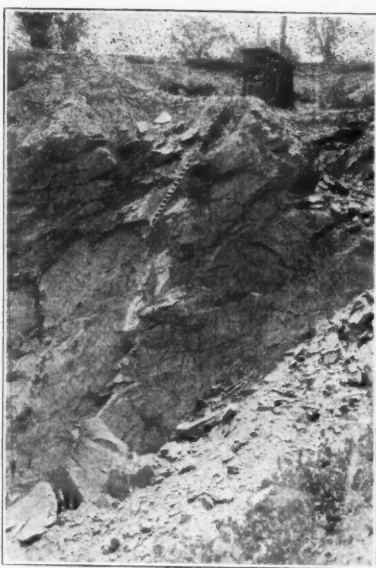
The arrangement of the hoister houses, aerial tramways or "ink lines," and "motion shanty" for the large quarry is especially efficient. The "motion house" or "shanty," embodies certain features which Mr. Jones has developed and which are unusual if not unique. The latter is located so that the man in it can see both the operations going on in the quarry and the engineers controlling the hoisting machinery in the hoister houses. He transmits signals from the quarrymen to the engineers—mostly by motions with his hands, whence the term "motion house."

This man, being situated so that he can accurately observe the hoisting, is also in the most advantageous position to observe accurately the horizontal travel of the carriage along the "ink line." It is in connection with the control of the stopping of the carriage by the man in the motion house that Mr. Jones has adopted his very ingenious and simple device.

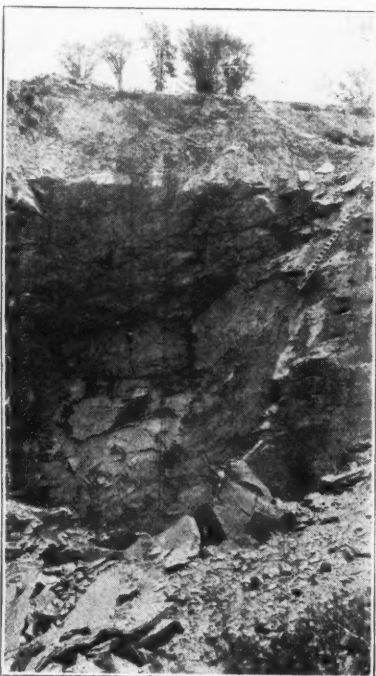
The wire rope by means of which the carriage is pulled back and forth passes around a pulley at the distant end away from the hoister house and it is fitted with a drum and brake band. This brake is controlled by the man in the motion house. In signaling to the engineer of the hoist he does so a little ahead of time and then stops the carriage in the proper position by means of the brakes after power has been shut off.

Of course when either waste or good material is deposited at some distant point where this man cannot see or hear well he does not attempt to use the brakes and the work is carried out as if they did not exist. Nevertheless a great deal of efficiency is gained and much power saved by the use of this simple device.

The brakes and pulleys may be located on the masts supporting the "ink lines" or on separate structures depending on the contour of the surface. The carriages, except the wheels, are made in the company's

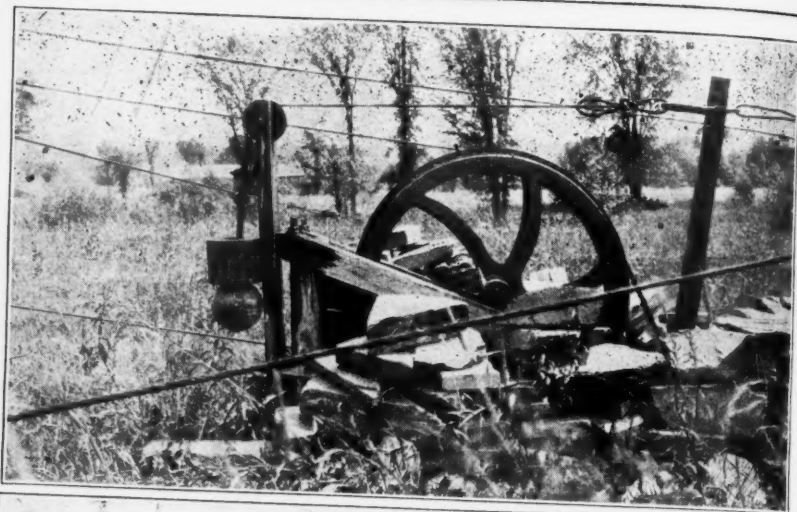


Motion Shanty for Man Who Transmits Signals from Quarrymen to Hoisting Engineers



Good Slate Being Removed. Note Men with Hoisting Equipment

PIT AND QUARRY



Above, Braking Apparatus Controlled from Motion House. Middle, Outdoor Transformer Bank. Below, Trimming and Splitting Houses

own blacksmith shop. The extra wheel seen in the illustration has no function except to increase the weight so as to make the carriage coast down the incline against the friction of the hoisting drums.

There are two sets of "ink lines," of two each, at right angles to each other. One set, running approximately east and west is used to carry away waste material and deposit it in a worked out part of the quarry where it will not interfere with future work. The other set, running about north and south, is used mainly to carry good material to space adjacent to the buildings where it is cut up, split and trimmed to various standard sizes for shingles.

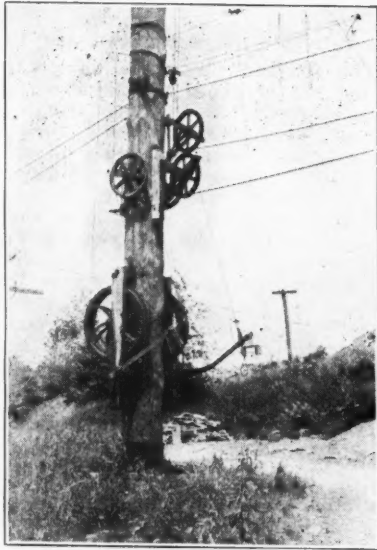
The attention which Mr. Jones has paid to the development and arrangement of his carrying apparatus is of course fully justified because it is the whole problem of handling raw material in the industry and by doing so he has secured a maximum degree of efficiency.

The large pieces of good slate as they come from the quarry are cut in sizes which can be handled for slitting by first drilling a line of holes, then making a groove between them with a chisel and striking a sharp blow with a wooden maul. The grain, as distinguished from the laminations, of the slate is such that this kind of cutting is possible. Slate from other quarries often has to be sawed. The pieces are then split by hand into proper thicknesses for shingles which are trimmed to final shape by machines. Holes for the shingle nails are also punched by a hand operated machine.

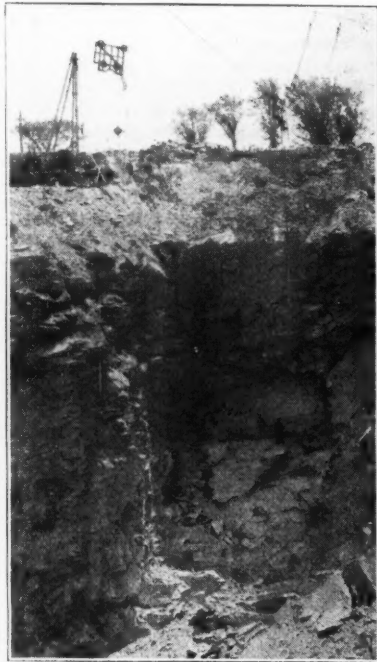
The quarries are worked practically all Winter but during the cold weather it is necessary to cover the seams which are being worked with swale hay in order to keep out the frost which, if it enters, makes it impossible to break the pieces loose.

As a general thing only two major blasts are made during each year. Of course a good deal of secondary blasting is necessary and the drilling for this is done with Sullivan jack hammers. To operate these and other pneumatic machinery there are two Sullivan compressors, one of which is driven by a 40 h.p. and the other by a 50 h.p. induction motor. It is only necessary to run both of these in Winter.

The two hoists are of the Lidgerwood type but they have been made



Braking Arrangement on Mast Controlled By Man in Motion Shanty



Well Drill Making Ready for Large Blast

up under Mr. Jones direction. They are run by 35 h.p. motors.

The finished product is of course stored out of doors and is arranged in neat rows. Man power machines are employed for making holes for the shingle nails. As slate is shipped with or without these holes, according to specification, a great deal of the surplus stock is stored without them. Consequently when an order comes in for delivery with shingle holes a machine for making them is taken out in the yard to a row of the proper sized slates where the operation is easily completed with a minimum of handling.

Ahearn Takes Up New Duties

Mr. V. P. Ahearn has been appointed active executive secretary for the National Sand and Gravel Association and editor of the National Sand and Gravel Bulletin. Mr. Ahearn will carry out the policies formulated by the late Mr. T. R. Barrows, who died on January 31st of this year. Mr. Ahearn came to the Association in March 1921 as assistant to Mr. E. Guy Sutton, who then held the position of executive secretary, and he served continuously in the same position throughout the term of Mr. Barrows.

With both Mr. Ahearn and Mr. Stanton Walker in the Washington office, the association membership can be assured competent and personal service on any matters submitted. The membership has already received benefit from Mr. Walker's word as director of the Engineering and Research Division of the Association.

Rigby Joins McMyler

Mr. Thomas A. Rigby has recently been added to the Pittsburgh office of the McMyler-Interstate Company.

Mr. Rigby has an excellent background to serve contractors. After being demobilized from the Canadian Air Force, he was employed by the Canadian National Railways to lay out construction surveys. In 1920 he became engaged in the work of reconstructing the water supply mains in the Capilano Creek water shed in the City of Vancouver, B. C.

On the completion of that work, Mr. Rigby superintended various canal and railroad grading contracts, in-

volving general excavating and concrete work.

He brings to contractors, producers and the railroads a wealth of practical knowledge and experience that enables him to give real service in the selection of the proper excavating and material-handling equipment.

Grindle Unit Pulverizer

The multi-stage unit pulverizer is the latest addition to the Grindle Fuel Equipment Company's line of pulverized coal machinery. It is the work of engineers who have spent many years in the study and perfecting of pulverized coal apparatus—men with a broad understanding of the practical operation as well as the theory of pulverized coal machinery.

The pulverizer consists of a series of swinging hammers mounted in stages. The vertical shaft is driven by a direct-connected 1800 r.p.m. motor. The housing which fits over the heaters has corrugated steel rings on the inside which clear the swinging hammers or beaters by about $\frac{1}{8}$ of an inch.

The crushed coal ($1\frac{1}{2}$ inch or under) is fed from a hopper onto the belt feeder. This belt passes over a magnetic pulley which removes the tramp iron. The coal then drops down the feed chute and falls on the top disc or stage of the pulverizer. Any foreign material such as brass, wood, slate, iron pyrites, etc., which passes by the magnetic pulley is thrown out by centrifugal force on the first or top stage and deposited in the foreign material box at one side of the pulverizer. The high speed at which the disc is revolving throws the coal out against the corrugated rings of the housing. On the rebound the beaters strike it, pulverizing the coal fine enough to pass down to the next lower stage and so on until it reaches the discharge chamber.

An important advantage of the pulverizer is that it can be arranged to furnish a very low volume of air at a relatively high pressure for blowing coal from discharge chamber to point of consumption, thereby overcoming the common fault of having more air than necessary for perfect combustion at low ratings.

When the pulverized coal is being separated for storage, only small volumes of air are handled, requiring a smaller capacity of collecting apparatus than is ordinarily used.

Compressed Air and Air Compressors

By C. H. Sonntag.

Types of Compressors

Vertical Single-Acting

COMPRESSORS are made in very small sizes, of which perhaps the most familiar are those found in filling stations for pumping up tires, but as they are too small to be of use in mine and quarry work we shall not consider them further. The smallest that is of practical value in these industries is the high-speed vertical type, either single or multi-cylinder, according to the capacity required. Except for the valves they are not dissimilar to a vertical gasoline engine, including, as they do, totally enclosed frames containing the oil, trunk pistons and more or less splash lubrication. A typical machine of this type is shown in figure 3 (e). This particular design is intended for stationary service with belt drive. It may also be had without the sub-base, but with lugs cast on the crank-case, so that it may be made portable by mounting on skids or on a truck.

Compressors of this design are practically always single stage and may have from one to four cylinders, but usually one or two. In the two-cylinder type capacities will range from 60 to 265 cubic feet per minute at speeds from 800 to 600 revolutions per minute and at pressures up to 125 pounds.

Vertical high-speed compressors will supply air for one or two standard tripod rock drills or several of the hand-hammer class, and so are particularly suitable for small operations, those worked only intermittently, or where the installation is more or less temporary, as a quarry opened in connection with some particular construction job.

Air-Brake Pumps

Another compressor that is eminently suitable within its capacity on projects where steam is available, as for instance from the boiler of a hoisting engine, is the air brake compressor. Every locomotive is fitted with one or two of them. In that service the air cylinders are air-cooled. This will be suitable for intermittent stationary service, but for continuous operation they may be had with water-jackets, and should be so specified.

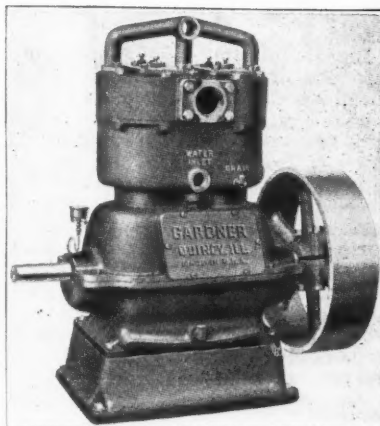


Figure 3

They may be had both single and duplex, and the latter either simple or compounded on both steam and air ends. The cylinders are double-acting, and capacities range up to about 150 cubic feet per minute. They are especially adaptable for running air riveters for steel erection, since they may be supplied with steam from the hoisting engine boiler. Like direct-acting steam pumps they are wasteful of steam, but this is counterbalanced by the many features that make them desirable for certain classes of service.

Single Cylinder Horizontal

This is probably the most common type of compressor in use today, since it demands a minimum of investment, and offers in exchange simplicity, ruggedness and reliability, though not the highest economy in power. It is essentially a simple horizontal steam engine with the cylinder modified for air compression. A typical machine is illustrated in Figure 4 (f). It will be seen that it possesses as far as possible all the features that have been found desirable in horizontal high-speed steam engines. These include total enclosure of crank, connecting rod and cross-head in one chamber, splash lubrication in that chamber, supplying also the main bearings, and a partition with separate packing gland at the rear of the crank-case, keeping the oil away from the cylinder head and making both

(e) Gardner Governor Co., Quincy, Ill.

glands accessible while running. The cylinder is overhung, but in many of the designs some of the weight may be carried by a pier under the suction elbow, which is underneath the cylinder.

Horizontal single cylinder compressors are offered in capacities up to about 500 cubic feet per minute to 100 pounds pressure. For larger outputs they are built duplex by placing two single stage machines side by side with a common crankshaft and belt-wheel or other drive, but when so much air is wanted it will usually be worth while to use the more efficient two-stage compressor. There is apt to be more trouble with the valves of a single stage machine working to 100 pounds pressure than if two stages are used, because of the higher air temperatures involved.

Horizontal Tandem Two-Stage

The advantages of two-stage compression coupled with simplicity and low cost are combined, within the limits of its capacity, in the horizontal two-stage machine shown in Figure 5 (g). Mechanically, it is the same as the single-stage machine, having only one frame, shaft, crank, connecting rod and cross-head, and the method of lubrication is the same. The only difference is that the one cylinder of the single-stage operation becomes the low-pressure cylinder of the two-stage machine, and to its rear end is attached a distance piece carrying the high-pressure cylinder. The cast-iron

(f) Worthington Pump & Machinery Corp., New York.

base is extended and supports for both cylinders are provided. The intercooler is mounted on top of the cylinders, and so does not increase the floor space required.

As far as running efficiency goes, this compressor will equal that of any two-stage machine of the same capacity, and its first cost is less than that of the cross-compound type. It has, however, some slight disadvantages that should be considered in making comparisons. One is the difficulty of getting at the interior of the low-pressure cylinder. If it is necessary to replace piston rings or even to inspect the bore, the whole high-pressure cylinder must be removed and the intercooler taken down or independently supported, and this involves a lot of work and time.

Another point to be considered is that, like the single stage machine, it has only two power impulses per revolution. If driven from a line shaft or independent steam or oil engine this is not of much moment, but if motor driven there will be two current peaks per revolution, which may cause flickering of lights connected to the same circuit. This can be minimized by the use of a heavy fly-wheel, and the matter should be taken up with the manufacturer before purchasing.

The tandem two-stage compressor may be had in capacities up to about 500 cubic feet per minute, running at 257 revolutions per minute.

Cross-Compound

These machines get their name from their resemblance to cross-com-

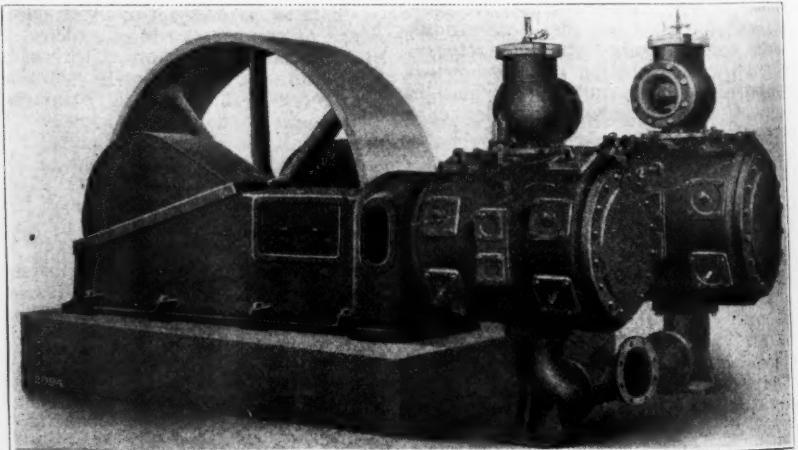


Figure 4

pound steam engines, and consist of a shaft having a crank at each end, each operating a single cylinder compressor. One has a large cylinder which raises the air from atmospheric to intercooler pressure while the other cylinder, which is smaller in diameter, completes the compression. Power is applied to the middle of the shaft, and both pistons have the same stroke. Figure 6 (h) illustrates a typical machine of this class. It embodies the valuable features of enclosed crank-case, splash lubrication, and double piston rod glands. In the machine illustrated the intercooler is mounted above the cylinders, but in other designs it is hung below them and may be supported from the floor. The choice of location is determined by the size of the intercooler and compressor and the preference of the builder.

Machines of this class are fitted with every refinement that has been found worth while in compressor design. One particularly valuable feature is the fairly uniform torque or momentary power demand obtainable. The cranks of cross-compound machines are always set 90 degrees apart, so that there are four power impulses per revolution, and these more or less overlap or merge into one another.

- (g) Sullivan Machinery Co., Chicago.
 (h) Chicago Pneumatic Tool Co., Chicago.

The result is more uniform belt tension or more steady current flow to the motor, and a much lighter fly-wheel may be used, for its weight and stored energy are not so necessary to smooth out the power curve. The majority of the better class compressors in sizes above 500 cubic feet per minute are of this class. They are obtainable in capacities up to 3200 cubic feet per minute at speeds ranging from 250 r.p.m. in the smaller to 164 r.p.m. in the largest.

Angle Compound

This distinctive type of machine is made by only one manufacturer. In design it resembles the angle-compound Corliss steam engines that were used in some of our largest central stations before the advent of the steam turbine. These stations were located on expensive city property, and adopted this style of engine primarily because of the saving in floor space, but also because smaller foundations could be used. These same advantages over cross-compound machines are claimed for the angle-compound compressor, together with another, a much closer balancing of the reciprocating forces arising from the motions of the pistons, cross-heads and connecting rods. Without attempting a complete analysis of these forces it may be said that the right angle arrangement does cause

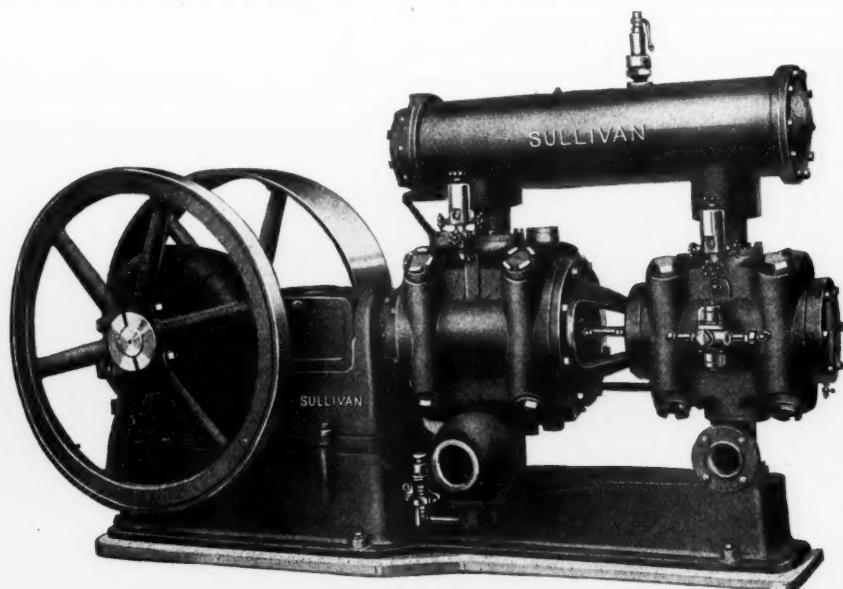


Figure 5

the unbalanced forces originating in the horizontal part of the machine to be partly compensated for by those of the vertical part, and the addition of a suitable counter-weight on the crank brings the remaining unbalancing to a very low value. This should not be confused with the momentary fluctuations in power demand through a single revolution. These will be about the same in the single angle-compound as in a cross-compound with the cranks set 90 degrees apart.

Figure 7 (i) is a vertical sectional view of an angle-compound compressor. The low-pressure cylinder is the horizontal one, since its parts are larger and heavier to handle. It will be evident that the foundation need be but little larger than half of what would be needed for a cross-compound machine. There is but one crank, on which both connecting rods work side by side, so that the cylinders are offset by the thickness of one rod, but this crank has a main bearing on each side of it. The position of the inter-cooler is evident from the illustration.

The machine is made as shown in capacities from 620 to 1852 cubic feet

(i) Sullivan Machinery Co., Chicago.

per minute. If greater output is desired from one unit it may be had by setting two machines side by side with their shafts in line and the pulley or motor between them. If the shaft is common to both, they must be operated together, but if there is a coupling between each machine and the central drive, one of them can be separated at times of reduced demand for air and only one compressor used. If in setting up a double machine the cranks are set 45 degrees apart, there will be eight power peaks per revolution, and the cyclic power demand will be almost uniform, making an ideal drive for a synchronous motor, even with a very small fly-wheel.

Duplex Tandem Compound

When the very largest output from one machine is wanted it may be had in this design. It consists of two tandem compound units like Figure 5 set side by side and having a common crankshaft on which the synchronous motor, practically the only drive used, is mounted. These machines have the same disadvantages as the single tandem-compound in that the interior of the low-pressure cylinder is inaccessible. In addition, much money and a large capacity is tied up in one unit,

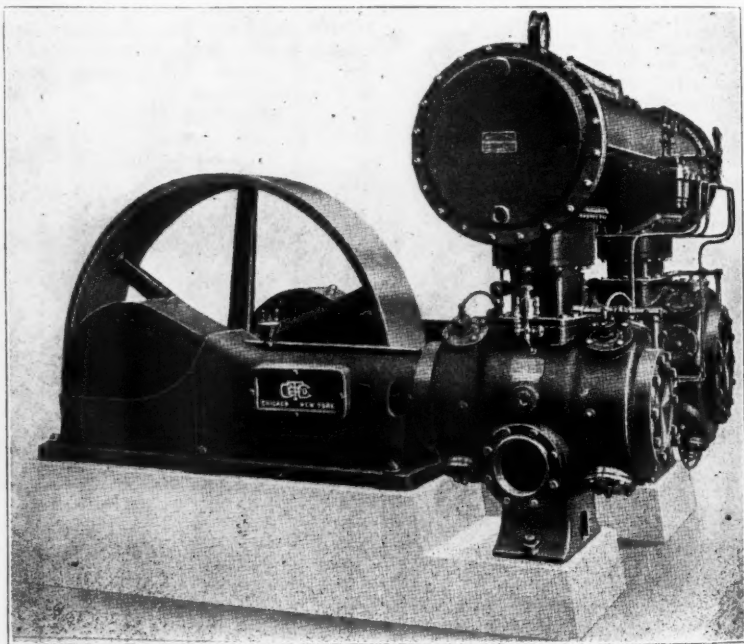


Figure 6

and its failure, even for a trivial cause, might seriously cripple operations. They are made in sizes up to 4500 cubic feet per minute. Only the very largest mines are justified in using them, and the average quarry would be better served by two or three compressors with capacities such that one could be shut down for repairs.

Portable Compressors

Increasing knowledge of the utility of compressed air has brought about a demand for it in places remote from stationary plants, and where the requirement is temporary and the work shifting in location, such as pavement breaking, sewer trenching, highway construction and similar jobs. Manufacturers have met this demand by designing portable compressors and mounting them so that they may be moved from place to place. Most of these include their own power plant, either a gasoline engine or an electric

motor. The first is an absolutely independent machine, while the latter must of course rely on some source of current. The ubiquitous Fordson has been recognized, and portable compressors may be had specially arranged for belt drive from that handy little power unit.

Portables may be divided into two classes—those for general out-door use and those especially intended to work in mines, though the latter will of course operate outside also.

Out-door portables may have either two vertical air cylinders or a single horizontal one. The former are direct-connected to 4-cylinder gasoline engines, and the jacket water for both engine and compressor is cooled by a radiator of the automobile type. An excellent example of this class is illustrated in Figure 8 (j). It has a capacity of 300 cubic feet per minute. The mounting shown is suitable for general out-door use, as the machine may be moved about by team or trac-

(j) Chicago Pneumatic Tool Co., Chicago.

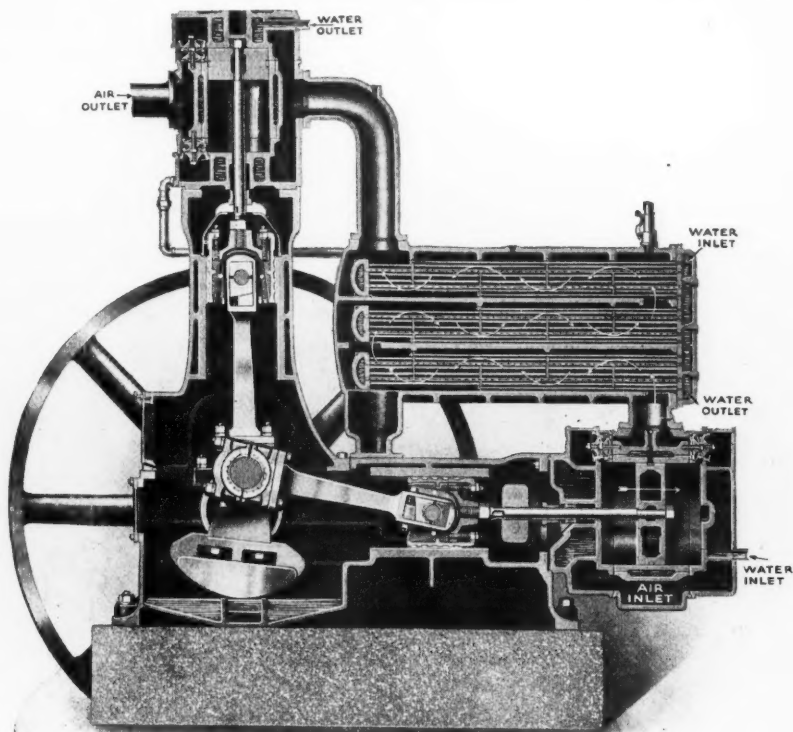


Figure 7

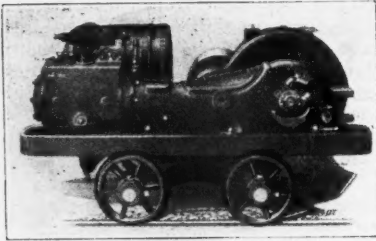


Figure 9

tor, but it may also be carried on four flanged wheels for running on railway track. The maintenance-of-way departments of our best railroads are using many such compressors for operating track-tamping tools which do the work both better and cheaper than it could be accomplished by hand. A machine like the one illustrated, but smaller and rated at 110 cubic feet per minute, may be mounted on a Ford 1-ton truck. Another larger one has four cylinders arranged in pairs on each side of the vertical like those of a V-shape automobile engine.

The single cylinder horizontal compressor uses hopper cooling for the air cylinder, the same as is used on many small horizontal gasoline engines. A tractor is the usual source of power, though of course any other

(k) Ingersoll-Rand Co., New York.

suitable one may be used. Machines intended to be driven by Fordsons are rated at 110 cubic feet per minute to 100 pounds pressure.

The mine type portable compressor is of single cylinder horizontal hopper-cooled construction, driven by an electric motor, as current is always available in a mine of any size, and the poisonous exhaust gases of an internal combustion engine are not permissible in a confined space. A typical machine is shown in Figure 9 (k). Hopper-cooling makes it independent of running water. Compactness is secured by gearing the motor to the fly-wheel of the compressor and mounting the whole on a substantial truck running on the mine track and carrying air reservoir, motor, control and extension cable. Capacities range from 75 to 300 cubic feet per minute, so that two or three tripod drills or several hand rotators may be used at the same time. While their largest use is in coal mines, they can be applied in stone or metal mines as well where permanent air lines are not laid, or in development work. They will of course do as well above ground as the vertical high-speed class. Either alternating or direct current makes a satisfactory drive, but in most mines the trolley is supplied with direct current at 250 volts.

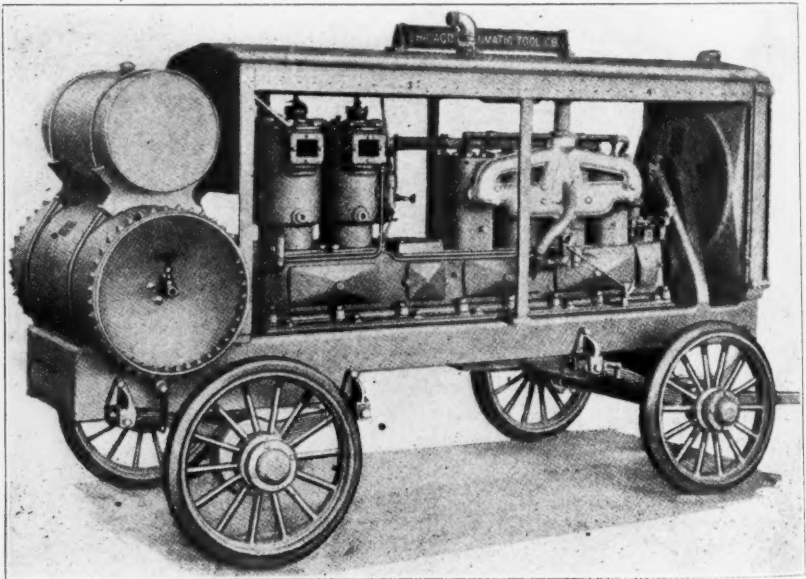


Figure 8

An Efficient Pre Mixing Concrete Plant

By E. D. Roberts

MIXING 200 cubic yards of specification concrete per eight hour day and delivering it to waiting trucks with but two men operating the mixing plant is easily accomplished by the Pre-Mixed Concrete Company at their new plant in San Diego, California.

In April of this year R. W. Whitaker, president and manager of the company, completed their plant which is located on Mission Valley Road near University avenue in the north central part of San Diego. It is over this road which winds down a steep hillside that a great portion of the sand and gravel used in San Diego is brought into the city from the plants located in the valley.

Taking advantage of the local topography, Mr. Whitaker was able to construct a plant very efficient in operation. The site was excavated at a point where the level ground at the top of the hill was high enough that trucks with aggregate drive out over the tops of the bunkers to dump. Cement is handled in the same way. There is no hoisting machinery at any point.

The plant itself is 13 feet by 27 feet in plan and is 40 feet in elevation. The bunkerage space on top is divided into four compartments—one for sand, two for 2-inch rock and one for 1-inch rock—each of which compartments has a capacity of approximately 55 tons.



The Pre-Mixing Concrete Plant

Below these bins we find the proportioning room. Here four Blaw-Knox batchers, equipped with special quick adjusting rods to enable the operator to make changes from one specification concrete to another operator, are used for the proportioning of the fine and coarse aggregate. After being measured in these batchers the aggregate is dumped into the proportioning hopper into which all dry material goes prior to being charged into the mixer. This proportioning hopper is equipped with a radial gate so that one batch may be proportioned while another is in the mixer.

Cement slides down a chute from the cement storage house above to a position alongside the proportioning hopper and at the same height. Before being placed in the chute the sack has been untied so that all the machine operator has to do is to tip it over and shake the sack.

Water is charged into the mixer through a 4-inch pipe running from an open top tank located on this floor, the line being opened by a lever act-

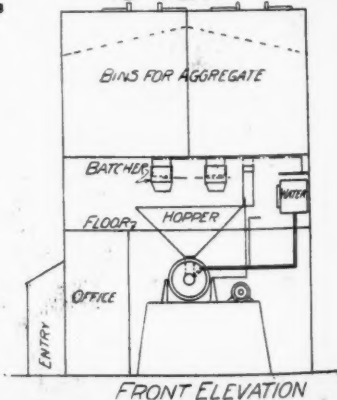
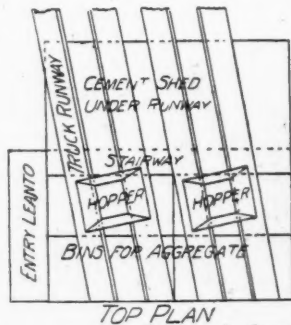
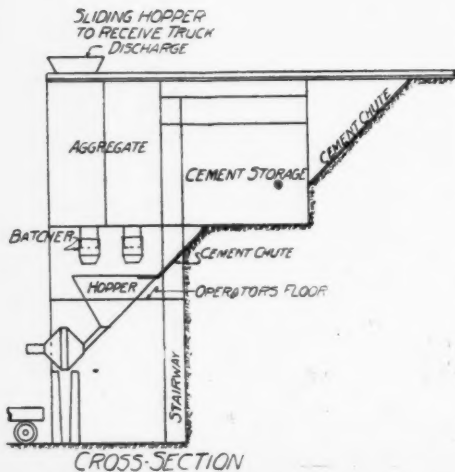
ing gate valve. The water tank is equipped with a gauge glass on which are arranged sliding indicators which are adjusted to the consistency of the concrete desired. The supply line to the tank is a 2-inch line from the city water service. Since the inlet line is always closed when the discharge line is open an accurate measure of the water used is always obtained.

The mixer, a 28S tilting Smith with a capacity of one cubic yard of mixed concrete, is placed on the floor below the proportioning floor with the operating lever extended up to a position convenient to the operator.

The machine is so placed that the operator can look into the mixer through the gate in the bottom of the proportioning hopper. In this way the consistency can be checked for the first batch or two, after which the water ratio is taken care of by measurement alone. A clock with a 13 inch dial around which a single hand makes one revolution per minute checks the timing.

The hauling of the mixed concrete from the plant is usually done in

PLANS & ELEVATIONS
MIXER PLANT OF
PRE-MIXED CONCRETE CO
SAN DIEGO CALIF



Reo Speed Wagons equipped with Heil dump bodies. These trucks carry one cubic yard at a time and make very quick delivery. On some of the large jobs, paving jobs particularly, where larger quantities can be handled at a time, the concrete is sent out in big dump trucks with two or three yard loads. All haulage from the plant is done by contract on a basis of mileage covered.

If the days run calls for less than 100 cubic yards, the machine operator does all the work around the plant himself. When runs larger than that are to be made a helper is secured to feed cement to the chute and do the cleaning up of the sacks, etc.

Aggregates are secured from Fenton-Parker Material Company, Inc., who operate a large sand and gravel plant in Murray Canyon, about 2½ miles down the road from the plant of the Pre-Mixed Concrete Company. Auto trucks deliver this material at a concrete rate.

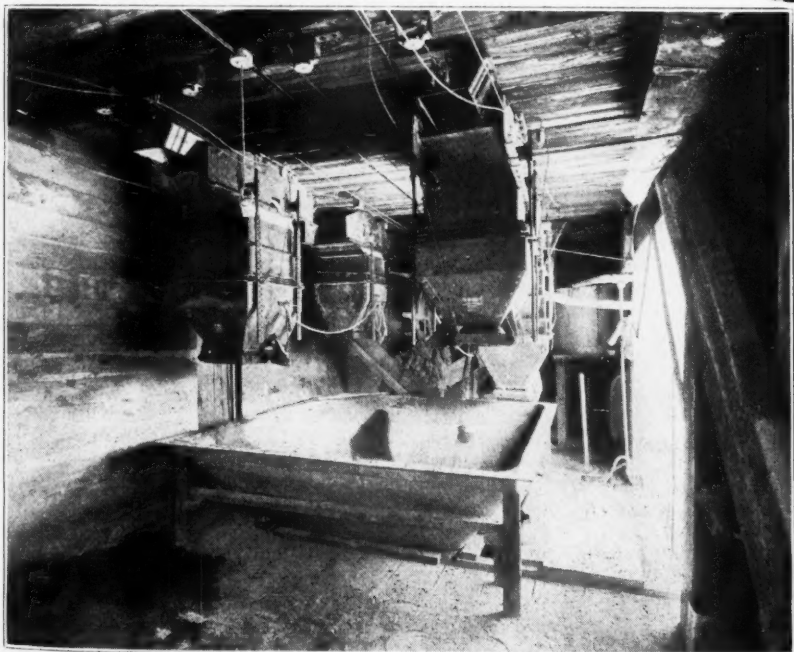
Mr. Whitaker, who was for four years a field engineer with the Portland Cement Association, reports that while the greatest field for the use of pre-mixed concrete is on the smaller jobs where the builder may not be

equipped to do concrete work, it has been found to be of advantage to some of the larger contractors who find it cheaper than setting up their own plant with consequent loss of time, wastage of aggregate, etc.

The climate of San Diego is such that construction work is carried on throughout the year and there is not much change in building activity as between the months.

Chicago Pneumatic Acquires Oldham

The Chicago Pneumatic Tool Company announces their acquisition of the George Oldham & Sons Company of Baltimore, effective February 16th. The manufacture of the Oldham products which are continued will be conducted at the Detroit plant, 6201 Second boulevard. The sales will be combined and handled from the Chicago Pneumatic Tool Company's branches now operating in the principal cities as well as through their domestic and foreign agency connections. The Oldham products requiring repairs should be sent to branch located nearest the customer or forwarded to Detroit.



Interior View Showing the Batching Machines

Requirements of Liquid Oxygen Explosives

Liquid oxygen explosives are admirably adapted for quarry work and open-pit mining, stated Frederick W. O'Neil, chief engineer, Ingersoll-Rand Company, and Herman Van Fleet, vice president, Air Reduction Company, in a paper presented before the annual meeting of the American Institute of Mining and Metallurgical Engineers, held in New York. The cost of liquid oxygen explosives for this work is much less than dynamite. The danger of digging into missed holes is eliminated, and there is no difficulty in handling the material or charging the holes. The amount of labor needed to dig holes with L. O. X. is less than with dynamite, as the cartridges are simply dropped into the holes and no ramming is necessary. As there are no lights in open-pit work, there is no danger of the cartridges catching fire. Even should they do so from sparks from steam shovels or locomotives, their burning in the open air would involve no serious consequences.

These facts summarize the results of research and practical work conducted by the above-named companies from early in 1922 to date. This work included a study of the history and physical theory of L. O. X. as an explosive, an investigation of the use and the practice with L. O. X. in the iron mines of Lorraine, where this type of explosive has its largest application in Europe, and laboratory research work on the properties of absorbent materials. Work on the properties of L. O. X. cartridges was performed in the Bureau of Mines explosives laboratory at Pittsburgh, Pa. Practical work underground with L. O. X. cartridges was conducted in the Witherbee-Sherman iron mines at Mineville, New York. Practical work was performed in the quarries of the Calcite Quarry Co., Myerstown, Pennsylvania, and practical blasting in several quarries and open-pit mines.

Reliable apparatus for the development of liquid oxygen has been fully developed and perfected. Two general methods are used: In the so-called "Linde" process refrigeration is obtained by the Joule-Thompson effect of free expansion through a nozzle. This method involves compressing the air to a pressure of 3,000 to 3,500 pounds per square inch.

The Claude system was developed

by the Compagnie L'Air Liquide in France, and the Air Reduction Company in the United States. In this process, refrigeration is obtained by expanding a part of the air in an expansion engine. Much lower pressures, and correspondingly lower powers are needed; the pressure required depending on the size of the plant.

The cost of producing liquid oxygen with a 75-liter per hour plant, Claude system, 24-hour operation, for a 28-day month, is placed at \$2,912, or a cost per liter of 5.77 cents and a cost per pound of 2.29 cents.

The ideal requirements for a liquid oxygen cartridge are as follows:

Maximum density in order to provide the maximum of explosive in a given volume. Ability to absorb liquid oxygen in excess of its requirements for complete combustion in order to provide excess oxygen for evaporation before detonation. Physical properties of filling material and wrapper which make the soaked cartridge mechanically strong so that it can be handled without breakage. This applies particularly to the wrapper which must not be too brittle at the low temperature of the liquid. The price of the filling material must be low enough for commercial use.

The soaked cartridge must be firm and dry. With some filling materials, especially when lightly packed, oxygen liquid readily squeezes out of the cartridges making them difficult to handle. A material that gives the maximum requirements of density tends to give the minimum capacity for absorption, and a commercial cartridge must be a compromise between these two requirements.

The requirements for a cartridge wrapper are as follows: The material should be combustible; it must possess the property of allowing liquid oxygen to permeate it readily; and it must not be brittle or fragile in soaking, to permit the soaked cartridges to be handled without breakage. It must tend to retain the liquid oxygen, and at the same time allow sufficient evaporation to prevent rupture of the cartridges by expansion of the gas. The material finally selected was pure rag stock paper varying in thickness from 0.007 to 0.010 inch. All papers which are filled or sized are unsuitable owing to brittleness when soaked.

Florida Portland Cement Company Has Started Plant Construction

ACTUAL work has been started on the construction of the new 1,500,000 barrel portland cement plant to be built at Tampa, Florida, for the Florida Portland Cement Company. The Cowham Engineering Company, designers, builders and operators of cement plants, have been awarded the contract for the construction of the plant. A sub-contract has been let to the Foundation Company, of New York, for the dock and sub-structures, and their engineers are now at work placing the pilings and footings.

The plant of the Florida Portland Cement Company will be located on the water front at Hookers Point, within the corporate limits of the City of Tampa.

The raw materials will be obtained from deposits in Hernando County, near the town of Brooksville, approximately forty-eight miles north of Tampa. The raw materials available have been estimated as sufficient to manufacture 160,000,000 barrels of cement. These properties are located on the Tampa Northern Railway, which will supply direct service to the plant at Tampa. Quarrying operations will be carried on by means of steam shovels on caterpillar treads, loading the raw material into standard railroad equipment for direct haul to the plant site.

Both the limestone and clay have been carefully analyzed and found to

be especially satisfactory for portland cement manufacture. A carload of the raw materials was ground, burned and mixed as in actual manufacturing practice at the plant of the Peninsular Portland Cement Company, at Cement City, Michigan. The test showed the materials to be especially well suited for commercial operation, especially because of the soft texture of the stone, considerably reducing the cost of grinding.

Crushing will be done by means of a large preliminary crusher, followed by a secondary crushing to a size suitable for mill feed. Preceding the crushing, the stone will be dumped from standard railway gondolas into a hopper, by means of a roll-over tippie dumping the entire car at one operation.

A reversible conveyor will allow the stone to go from the dumping hopper to the crushing department, while clay will be brought in over the same track, dumped in the same manner and deposited in the clay storage by reversing the belt. A 26-foot clay wash mill will break the clay down, while the rock will be ground wet in combination grinding mills, discharging the mixed rock and clay into a sump, from where it will be pumped to slurry storage tanks by means of centrifugal slurry pumps.

In addition to six slurry storage tanks, two large tanks will be pro-



Drawing of New Florida Portland Cement Company Plant

vided to assure chemical control of a correct mix for kiln feed.

The clinker burning department will consist of three 11x175 foot kilns, followed by 8x70 foot coolers, the coolers discharging directly into the clinker storage.

Centralized storage will be featured. The storage building is 80 feet in width by 800 feet in length, and will serve to store all the raw materials used in the plant, including rock, clay, clinker, coal and gypsum. This building will be equipped with two electric traveling cranes with grab buckets of 2½ cubic yards capacity.

The finished grinding department will have a capacity of 8,000 barrels per day, to take care of any peak demand that the market might warrant.

The coal mill, which will be located directly adjacent to the burning room, will be supplied with three units, two of which will be ample to supply pulverized coal to the kilns as needed, allowing a third unit for reserve. The raw mill, finished mill, coal mill and burning room will be connected to the main storage. A 150,000 barrel storage will be built for the finished cement. This will be built of reinforced concrete of the conventional silo type. Fuller-Kinyon conveying equipment will be installed in this department.

An extra pack house will be located on the wharf, making it possible to market the entire production by either boat, truck or rail, as conditions may warrant.

Waste heat boiler equipment will be installed in connection with the kilns. This installation will be sufficient to furnish an excess of power and light for all the plant requirements. Power will be supplied by means of steam driven turbines of the latest improved type.

A commodious storeroom and machine shop will be located conveniently near the mill buildings. A laboratory equipped with the latest improved testing apparatus will be housed in a special building for that purpose, near to mill operations.

The plant will be entirely of steel and concrete construction. It is estimated that about one hundred seventy-five workmen will be employed. Because of the location of the plant within the corporate limits,

complete dust proof equipment will be installed.

The Florida Portland Cement Company has been organized with John L. Senior as its president. Mr. Senior has been identified with the cement industry for a number of years and is known for his success in cement plant operation. He is president of the Signal Mountain Portland Cement Company at Chattanooga, the Peninsular Portland Cement Company at Cement City, Michigan, and is a director of the Peerless Portland Cement Company with plants at Union City and Detroit, Michigan, and the Trinity Portland Cement Company with plants at Fort Worth and Dallas, Texas. Associated with Mr. Senior as vice presidents will be R. A. Drum, vice-president of the Cowham Engineering Company of Chicago, and H. J. Weeks, assistant general manager of the Signal Mountain Portland Cement Company of Chattanooga. R. N. Cowham, vice-president of the Peninsular Portland Cement Company, will be secretary and treasurer of the Florida Portland Cement Company. The other members of the Board of Directors will be:

J. L. Caldwell, president of the Tennessee Stove Works, Chattanooga, and vice-president of the Signal Mountain Portland Cement Company, Chattanooga; J. A. Griffin, president of the Exchange National Bank, Tampa; J. P. Hoskins, president of the First National Bank, Chattanooga, and treasurer of the Signal Mountain Portland Cement Company, Chattanooga; H. T. Lykes, Lykes Brothers, Tampa; H. C. Piper, of Lane, Piper and Jaffray, Investment Bankers, Minneapolis, Minnesota; W. A. Sadd, president of the Chattanooga Savings Bank, Chattanooga, and chairman of the Board of Directors, Signal Mountain Portland Cement Company, Chattanooga; W. H. Wildes, of E. H. Rollins & Sons, Investment Bankers, Chicago.

The financing of the project will include a public offering soon to be made by the Cowham Engineering Company. About \$2,500,000 has already been subscribed by the organization syndicate and the remainder will be offered to the public within the next thirty days. The public offering will be made on the basis of 7 per cent cumulative participating preferred stock, selling at par and carrying with it a bonus of a half share of common stock.

Producing 1500 Tons of Ballast Daily With Economical Layout in Oregon

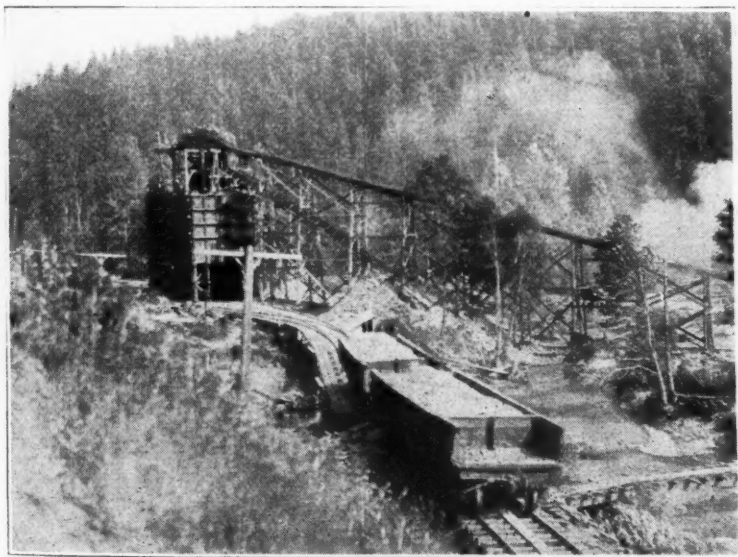
THE Western Sand and Gravel Company is one of the many producers operating in the picturesque Oregon territory. This company built a plant in 1925 at Westfir, Oregon, at the junction of the Middle Fork and the North Fork of the Willamette River. The deposit covers 20 acres and runs heavy in boulders from 8 to 24 inches in diameter. The rock is hard and clean. The operations at the present time are concentrated on producing ballast for the Natron division of the Southern Pacific Railroad.

A five yard Baggy bucket operated by a 12¼ x 13 Tacoma steam yarder is used to haul the material up a short incline where it is discharged to a hopper. From the hopper the material is fed to a 28x36 Traylor jaw crusher. This crusher discharges to a 24 inch belt conveyor which elevates the material to the top of the screening and crushing plant. This is a distance of 250 feet and an elevation of 60 feet. The belt conveyor is equipped with Hesse ball bearing idlers and rolls. The conveyor dis-

charges to a bar grizzly 4 feet wide and 10 feet long.

Material passing through the bar grizzly passes into a 48 inch by 15 feet Allis Chalmers trunnion screen with a capacity of 75 tons per hour. The screen separates the desired sizes. The oversize passes to an 8 inch Traylor gyratory crusher. The discharge from the 12 inch gyratory passes to a 48 inches by 8 feet scalping screen where the material is sized. The oversize from this scalping screen is passed to the 8 inch gyratory crusher. The scalping screen discharges to the same hopper as does the 8 inch gyratory crusher. This hopper feeds a bucket elevator which discharges to a 48 inch by 12 feet spider screen which in turn separates the required sizes. The bins have a capacity of 2000 tons and are equipped with 10 gates each 12 x 18 inches. These gates are so arranged that five of them will feed to one car at a time which makes it possible to load a car in very short order.

The scalping screen and the spider screen were built by the Willamette Equipment Company while the belt



Showing Tail Track with Cars Leaving the Bins



Showing the Path of the Five-Yard Bucket

conveyor and the bucket elevator were supplied by the Clyde Equipment Company.

The plant is electrically operated with the exception of the steam yarder which is steam with oil for fuel. The production averages 150 tons per hour with seven men oper-

ating the plant and one night repair man. Ballast is produced in sizes from $\frac{3}{4}$ to $3\frac{1}{2}$ inches and from $\frac{3}{4}$ to $2\frac{1}{2}$ inches.

Mr. A. J. Sullivan is president of the Western Sand and Gravel Company, while Mr. C. E. Torkelson is vice-president and general manager.



The Plant of the Western Sand and Gravel Company

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Small But Profitable

The New Braunfels Limestone Company of New Braunfels, Texas, have passed through one profitable year and can be expected to cut into the crushed stone market in their territory to a larger extent this year.

Their plant was completed in September of 1924 and represents an efficient and economical outlay of money. The present plant capacity is 500 tons per ten hour day.

An interesting fact is that it is remarkably cheap to use Mexican labor to load stone from the quarry by hand to the 1½ yard end dump cars which are being used. The stone is crushed to the required size by a number 4 Williams "Jumbo" hammer mill. It is elevated to the Austin screens by an Austin bucket elevator. A 165 h.p. Anderson oil engine supplies the power for the entire plant.

Ingersoll Rand jack hammer drills supplied with air by an Ingersoll Rand air compressor are used in quarrying the stone. The quarry is a dry ravine and the stone is a medium hard limestone which is practically a pure calcium carbonate.

The officers of the New Braunfels Limestone Company include M. A. Altgelt, president and general manager; A. Henne, vice-president, and Walter Zipp, secretary. The illustrations



A Close-Up of the Crushing, Screening and Storage Building. This Illustrates the Simplicity of Construction and the Economical Investment

show what an economical structure has been made. It can be said that the plant is simple, efficient and profitable.



The Plant of the New Braunfels Limestone Company at New Braunfels, Texas. Note the Character of the Material Shown Here

New Novo Pump Units

The Novo U F two cylinder 3-6 h.p. gasoline engine is used as the power unit on the three new Novo diaphragm pumping outfits just put on the market. The engine has a 180 degree, opposed throw counterbalanced crankshaft running in Timken roller bearings. The engine is hopper or radiator cooled. The connecting rod bearings are pressure cast babbitt, reamed and burnished and the cam shaft runs in brass bushings. It has 3x4 bore and stroke.

Diaphragm pumps usually work under conditions not conducive to long life of the wearing parts but the self oiling speed reducing unit encloses and protects all gearing eliminating many disadvantages of the open geared type of pump.

The self oiling units are built by Novo and are used exclusively on their pumps. This development was shown for the first time at the Chicago road show where it created considerable interest. The manufacturers say the pumps are surplus powered and smooth running thus minimizing the strain on both the engine and pump and lengthening their life.

Both single and double pumps are built; open and enclosed type. The Novo UF 3-6 h.p. two cylinder engine is regularly furnished with steel house.

Sterrett Elected President

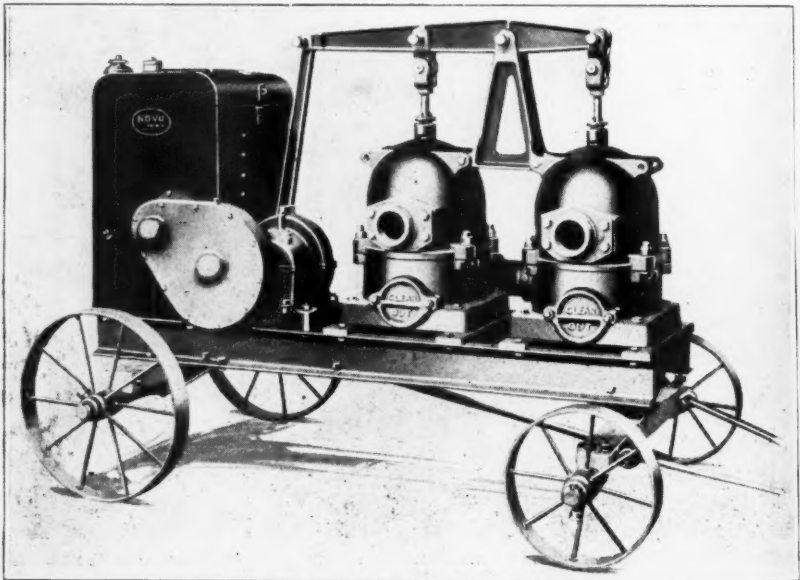
At the annual stockholders and directors meeting of the Alfred Sand and Gravel Corporation which was held at Hornell, New York, on March 3rd, Mr. Frank W. Sterrett was elected president and treasurer. Mr. Sterrett was formerly secretary, treasurer and general manager. He will continue his duties as general manager and the operations of the company will be under his personal supervision.

Safety Friction Wrench

A safety friction wrench which the manufacturers say can be thrown into an ash pile or a grease can and will still be an efficient agent for dumping or winding up the pockets of hopper and dump bottom cars is being put on the market by the Barrett Machine Company.

The wrench has no complicated parts, no ball bearings, no ratchet heads and no pawls or triggers to catch. It has a smooth conical head held by two straps.

The Portland Cement Association has appointed R. S. Taggart as district engineer in charge of its work in western Pennsylvania. His office will be in the Farmer's bank building, Pittsburgh. Mr. Taggart has been connected with the association since 1921, having served as field engineer in Ohio and in western Pennsylvania.



The New Novo Pump Unit

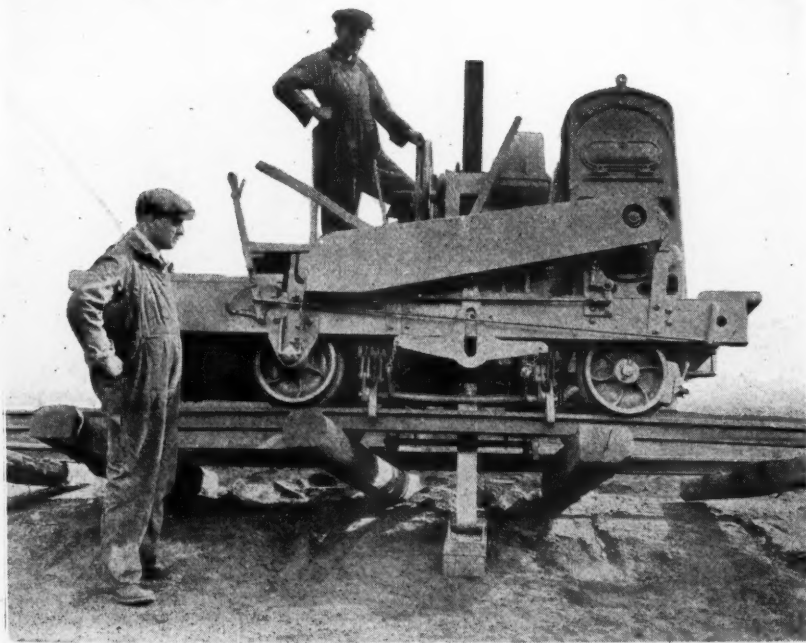
An Efficient Track Shifting Machine

Track shifting is always a serious problem, involving time and labor problems but it grows more difficult with freezing weather. A machine, which the manufacturers claim obliterates the ordinary problems of this work is put on the market by the Nordberg Manufacturing Company. It is the Nordberg Patent Track Shifter, designed especially for use in open pits, quarries, waste dumps and construction work where large quantities of material must be handled with frequent moving of track. The Nordberg shifter is a self-contained machine, capable of a speed on the track of twenty-five miles an hour. It has a platform for carrying a small track crew which will be required for tamping and blocking after the shifting. No track jacks are needed as the machine will raise one side for leveling after the shift is made. When a stretch of track is to be shifted, the operator of the machine throws a lever which clamps the mechanism to the rails. A spud with a foot piece located between the ties, is then racked

down to the proper angle. When the foot-piece is placed on the ground, a powerful upward force is exerted pulling the rails and ties free.

The manufacturers say the machine defies the elements and works efficiently where the rails are frozen down. With the spud offset from the center of the track, the rails and ties on that side are first raised and as the height increases and more track is lifted from the ground, the load becomes so heavy on the stilted spud, that it lays or falls over and carries the entire track section to a new position. The rail clamps are then released and the shifter moved ahead thirty or forty feet and the entire operation repeated until the whole track is moved. A second trip over the track will result in a total movement of from five to eight feet. This is generally sufficient on dumps.

It is claimed the new machine will do the work of from fifteen to twenty men in about one-fourth the time required for manual track shifting. Five or six men with this machine consti-



The Track Shifting Machine at Work

tute an entire track gang and eliminate the use of track jacks and bars.

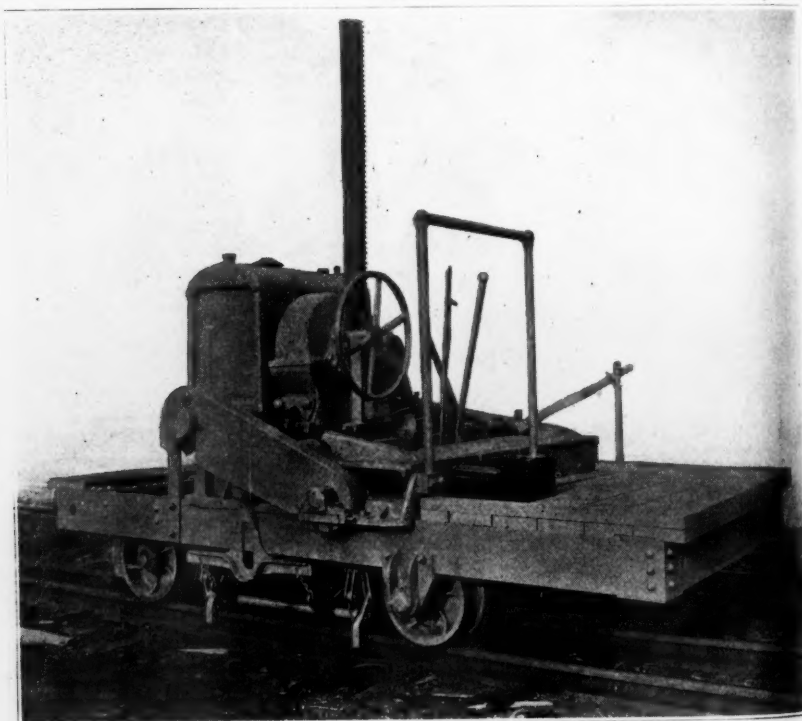
The frame of the machine is a heavy channel steel, riveted together. Cast steel is used instead of cast iron for all parts subject to excessive strain. A fully enclosed 40 h.p., four cylinder internal combustion engine is used. Worm and gear which supply the power to the spud are liberally proportioned and assure long life and a minimum of wear. They run in an oil tight case with three inches of oil above the worm and its roller thrust bearings. Transmission is equipped with full roller bearings throughout. Hardened uickel steel gears with 1½ inch face in an oil bath enclosed in an oil tight case. The track wheels which have wide chilled faces also run on roller bearings. Transmission brakes set automatically when spotting the spud foot piece between the ties. Front wheel brakes are also supplied. The clutch is a standard automotive type, forward and reverse. The lifting speed of the spud is 22½ feet per minute. Where the track must be drawn over hard or rough ground the rapid

lifting is considered important to get a wide shift.

The machine which has a lifting power of 30,000 pounds, is built under the Ernest A. Peterson patent. The exclusive license for which is now in the hands of the Nordberg Manufacturing company.

New Expansion Wheels

French and Hecht, pioneer wheel manufacturers, have developed a new line of built-up expansion wheels that carry large hard rubber tires that promise to meet with good demand in the industrial tractor field. These wheels differ from the usual solid wheels in being much lighter and hence easier to handle and less expensive to operate. A distinctive feature is the use of an expansion device located in the rim which absorbs any variation in the inside diameter of the rubber tire, which is not possible with solid wheels. The same expansion device entirely eliminates the need for power presses for mounting or demounting the rubber tires from the wheels.



The Track Shifting Machine as It Stands on the Track

Power Shovel Under Ground

A type of power shovel that is likely to be useful in any industry under certain conditions is the Marion standard type 21 with bow type boom. This shovel is obviously a tunneler. It operated under ground in, we are told, only eleven feet of headroom. Its maker, the Marion Steam Shovel Company, points out that because of its short boom and dipper stick and the consequent shortness of its swing, it loads cars with great rapidity.

The Marion electric thus equipped and shown in the photograph is owned by the Oakdale Contracting Company of Brooklyn, N. Y., and used in connection with their Brooklyn subway contract. This shovel is said to have handled tremendous yardage within the cramped confines of the subway cut, loading into cars at grade.

Operators having work involving underground or deep cut digging in cramped surroundings will be interested to note how such standard types of power shovels can, by the use of special booms like the one shown, be utilized under ground and depended on to handle a big output daily.

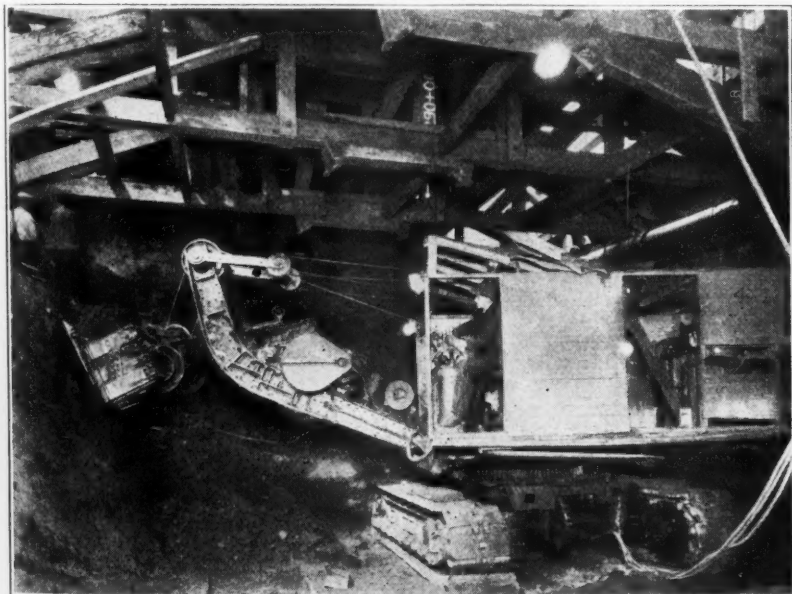
It is said that such conversions require no change from the standard operation, the same controls being used as with the conventional type of boom.

American Hoist Expands

The American Hoist and Derrick Company, which has its works and main offices at Saint Paul, Minnesota, has recently opened another branch office, at 1943 Railway Exchange building, St. Louis, Missouri with Ward B. Maurer in charge. Mr. Maurer has a wide acquaintanceship among railroad men and users of hoisting machinery in general. Before joining the sales force of the American Hoist and Derrick Company, several years ago, he was a member of the engineering staff of the Baltimore and Ohio Railroad. The American Hoist and Derrick Company also maintains offices at Chicago, New Orleans, New York, Seattle and Pittsburgh.

Climax Appointments

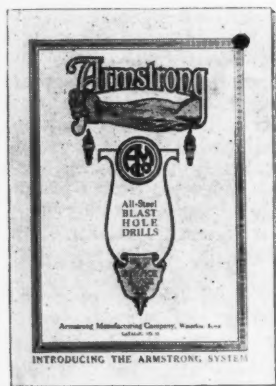
Climax Engineering Company have appointed several new dealers for the sale of their well-known Climax "Trustworthy" Engines. H. Y. Smith Company, 1301 First National Bank Building, Milwaukee, Wisconsin, has been named in Milwaukee and Eastern Wisconsin; A. K. Miller Engineering Company, 112 North Water street, Mobile, Alabama, for Southern Alabama, and L. H. Staley, 515 Whitney Building, New Orleans, for Louisiana.



The Marion Working Under Ground

Story of the Quarry

The Armstrong Manufacturing Company has just issued a new blast hole drill catalog, "The Story of the Quarry." This 64 page book traces the history of the big hole or churn drill from the day of the first Wooden drill used in quarry work to the mod-



ern All-Steel drill of the present time, and contains interesting information on different quarrying methods and practices which led to the development of the "Armstrong System." It also contains semi-technical data on drilling and blasting, illustrated with many quarry views, and gives a description of the machinery, tools and accessories used in this work.

Summit Limestone Products Company, Pittsfield, Mass. (mining and quarrying); capital, \$1,000 no par value shares. Incorporators: Edmund Putnam, William T. Nesbitt, Jr., and LeRoy E. Shaw, all of Pittsfield, and Nelson E. Wright, Springfield, Mass.

New Speeder Ditcher

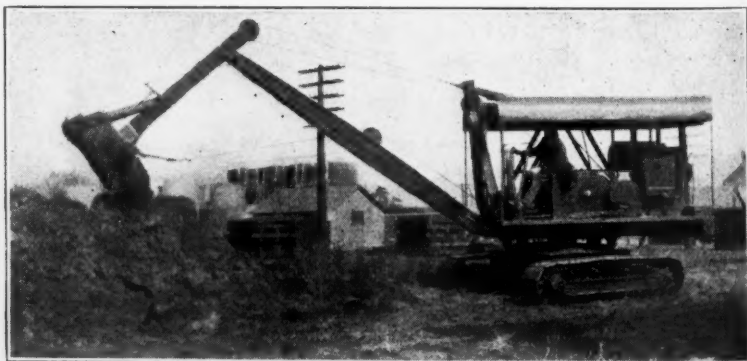
The ditcher or trench shovel is the latest attachment developed by the Speeder Machinery Corporation, for use with the Speeder excavator. This ditcher is attached to the regular dipper shovel boom, after removing the dipper and sticks, thus requiring investment in only one boom for both types of shovels.

The trench bucket is made in various widths, according to requirements, the 28-inch bucket, cutting 30 inches, being most used. This bucket, of half-yard capacity, has latch-operated, bottom-discharge door for loading into wagons and trucks. A special feature is the direct inhaul on the bucket, a single line being used. Variation in the hoisting and digging line speeds can be had by lagging the drums, and the digging line can be still more varied by using the low speed clutch.

This ditcher digs to a depth of sixteen feet, and has ample dumping clearance to load into trucks when necessary. The bucket is tripped from the cab and closes itself on the return stroke.

The Speeder, which is a full revolving machine, caterpillar mounted, handles both the trench shovel and half-yard dipper shovel.

A new bulletin describing Bucyrus 120-B steam or electric 4-yard full revolving shovel has been issued. It is 8¼ by 10½; 32 pages and covers. It describes and illustrates and contains a heavy duty mine and quarry shovel which can be equipped with 4, 3½ or 3 cubic yard dippers. Considerable space is given to details of the machinery and a number of photographs of operation are included.



The New Speeder Ditcher Shovel

New Utility Air Hoist

A new size DU "Utility" air motor hoist has been developed by the Ingersoll-Rand Company. This size DU hoist has been especially designed for use with portable compressors and is suitable for a wide variety of work. It is a hoist of general utility in every sense of the word and is an ideal addition to any portable outfit.

The "Utility" hoist is a light, compact hoist of the winch type. It is provided with mountings by which it may be attached to the rear end of a 5½x5 or 5x5 portable compressor, or to compressors mounted on Ford trucks. In such cases it is always ready for use and adds but little to the overall dimensions and weight of the compressor. It is a sturdy, reliable, economical hoist capable of exerting a rope pull of 1000 pounds and of taking 350 feet of 5-16-in. cable. A swivel bolt through the bottom of the base permits the hoist to be swung around into any desired position.

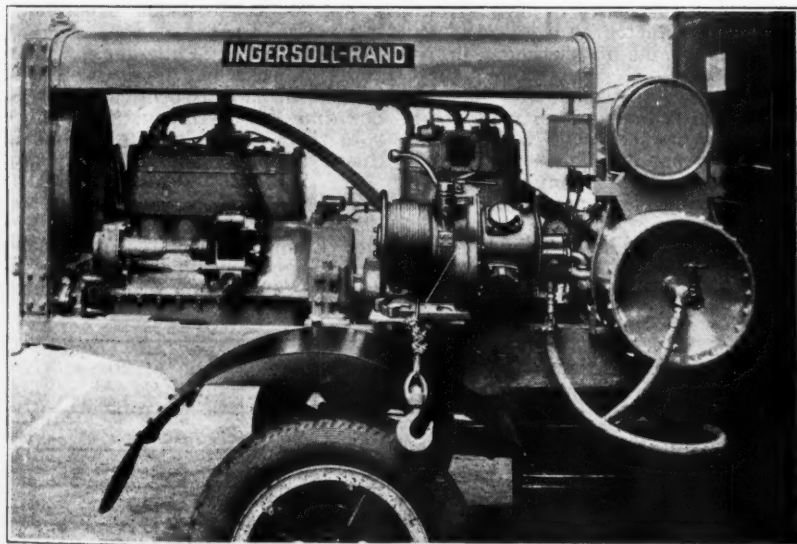
The "Utility" hoist is equipped with a clutch so that the cable can be easily played out by hand or by a down grade load without turning over the motor and consuming air. A hand brake on the drum is provided to check the unwinding and stop it in any desired position. The throttle control is very sturdy and so sensi-

tive that any speed of rope travel can be obtained—from the very slightest movement up to a maximum speed of 65 feet per minute, although carrying full load of 1000 pounds at an air pressure of 80 pounds per square inch.

The "Utility" hoist is extremely economical in air consumption. Even while lifting a 1000-lb. length of pipe into a trench, it can be operated by a 5½x5 portable compressor which is supplying air for a size 58 or 158 Pneumatic Digger. A winch head can be furnished in place of the rope drum.

Allis-Chalmers business in Continental Europe will be handled through an organization recently incorporated as Allis-Chalmers (France), with headquarters at 3 Rue Taitbout, Paris. Mr. H. I. Keen, who has been Manager of European sales through the Company's District Office in Paris, will be the Managing Director of the new organization. The Company has maintained for many years an office in London, 728 Salisbury House, London Wall, P. C. 2.

Climax Engineering Company, announce the appointment of Rapp-Huckins Company, Inc., 59 Haverhill Street, Boston, Massachusetts, as district representatives for the sale of Climax Industrial Power Houses and Engines.



The Ingersoll Rand Utility Air Hoist

Humphryes Pumps

Humphryes life and force trench pumps are sturdily constructed, of compact design, and easily portable. They can be supplied with diaphragms or cut-side packed plungers. The field of usefulness of a lift and force pump is really double that of the open diaphragm pump. Water can be lifted twenty-five feet by suction and then forced beyond the pump through a discharge hose or pipe. By disconnecting the discharge line, the pump is suitable for open diaphragm work.

The construction of the pump includes:

1. Ball valves resting on machined seats assure positive action. The construction of the valves is such that there is no place for solid matter to lodge.
2. The air chamber incorporated in the discharge manifold evens the load on the pump and the hose.
3. Large direct waterways give the pump large capacities.
4. Suction and discharge connections are located on both sides of the pump.
5. Valves can be removed and the pump cleaned by merely removing the port caps.
6. Eccentric disc and shaft are of steel cast in one piece. Shaft is of large diameter running through two large babbitt bearings.
7. Connecting arms are of heavy I beam section.
8. Pinion and gear are machine cut and amply protected by a guard.
9. Every point of friction is properly lubricated.
10. Pumps are mounted on hot riveted steel frames with sturdy steel trucks. High wheels with wide treads permit easy handling.

When equipped with diaphragms the pumps are suitable for pumping water containing large amounts of mud, sand, grit and sludge. This type of pump is constructed for moderate pressures. The diaphragms are the

highest grade obtainable. Two diaphragms can be easily replaced by one man in half an hour.

Equipped with plungers the pumps are suitable for higher pressures, although they are not recommended for pumping water containing large amounts of grit. The plungers are outside packed, enabling the packing to be easily tightened or replaced.

Now the Era Steel Company

The increasing demand for "Era" manganese steel, and other alloy steel products has made it advisable to operate the steel foundry department of the Hadfield-Penfield Steel Company as a separate unit; accordingly, the Era Steel Company was incorporated, and March 1st, 1926, took over the operation of the steel foundry, and the sales of manganese and alloy steel products of this company. It is believed this separation will make possible a stronger and better organization, and will enable them to better serve the trade.

Footnote Notes

John R. Shays, New York district representative for Foote Bros. Gear & Machine Co., Chicago, has found it necessary to take on another assistant in the sales department to take care of customers and prospects in the New York Territory. Manuel Granich, the new man, is a sales engineer of considerable experience in mechanical lines.

H. H. Snell, Philadelphia district representative has found it necessary to take on two associates, W. R. Milnor and W. C. Darugh, who will devote their efforts to the sale of IXL Speed Reducers and industrial gears.

P. A. Koehring, general manager and secretary-treasurer of the Koehring Company, was recently unanimously elected president of the Milwaukee Association of Commerce.

Specifications

Fig. No.	Style Pump	Size Suction & Discharge	Approx. H.P. of Engine	Max. Section Lift, Ft.	Max. Disch. Head, Ft.	Cap'y G. P. M.	Over All Length	Approx. Shipping Weight
360 ET#3	single diaphragm	3"	1 3/4 or 2	25	30	50	4' 6"	1000
960 EDT#3	double diaphragm	3"	2 1/2 or 3 LeRoi	25	30	100	5' 6"	1840
960 EDT#3	double plunger	3"	2 1/2 or 3 LeRoi	25	50	100	5' 6"	1885
960 EDT#4	double plunger	4"	3/4 LeRoi	25	50	220	6' 0"	1700

New Link Belt Loader

A new crawler loader, known as the "Grizzly," has just been announced by the Link-Belt Company. This machine contains all that company's latest developments and improvements, in design and detail of construction, and is said to handle crushed stone, gravel, sand, phosphate and like materials at the rate of 1½ yards per minute—or about 140 tons per average hour.

This new crawler loader is a one-man machine. Its driving, its operation, and its care can be handled entirely by one worker. Four units compose the loader, i. e., the elevator, the chassis, the power plant, and the crawler. The unit system of construction enables the operator to inspect the machine easily, and to make any adjustment or repair without tearing the whole machine apart.

Special attention has been given to the lubrication of all moving parts, all of which are provided with Alemite fittings or grease cups placed within reach of the operator. The makers of the loader assert that any one can learn to operate it with but a few minutes' instructions. It can travel forward and reverse; and turn right or left when traveling in either direction.

The elevator is controlled by separate hand lever, which operates a steel clutch, and disengages automatically when machine is started in reverse. The Grizzly has a rated capacity of 1½ cubic yards per minute, with uniform feed. Such a capacity means, conservatively, that about 140 tons of crushed stone, gravel, sand, phosphate, etc., can be handled per hour, under average conditions, with the loader working steadily.

The buckets are of special design, with reinforced edges to reduce wear. They are spaced closely enough, on double strands of malleable iron and steel chain, to insure a steady delivery of material to the chute at the head of the elevator—the principle involved being that close spacing of buckets permits a lower speed of the elevator, with consequent less wear of parts.

Head and foot sprockets are made of manganese steel, cast in two parts, and clamped on hexagonal steel shafts. This eliminates troublesome keys. The hexagonal shafts are journaled, and are run in babbit bearings, oil-grooved, and provided with Alemite

fittings. The driving wheel on elevator shaft is provided with a safety breaking pin.

The chute at the head of the elevator, as ordinarily furnished, is of the swiveling type. It operates through an angle of 180 degrees, and can be controlled from the operator's platform.

The feeder consists of manganese steel paddles, securely bolted to the hexagonal steel foot shaft, and so arranged as to produce a steady feed of material to the buckets. Feeder adjustment and collapsing mechanism are both controlled by a hand wheel within reach of the operator.

The chassis is made of heavy angles, plate and channels, securely riveted together, making a substantial support for elevator and machinery. A large steel casting is riveted to the chassis, forming a support for the chassis, and the connection to front crawler shaft, as well. The rear of the chassis is supported on a large steel bracket casting, which is pinned to the rear axle. The power plant is a simple, compact, gasoline power unit of 30 h.p. at 1,200 r.p.m., equipped with a governor; or electric motor equipment to suit the conditions. The truck transmission has 3 speeds, giving a speed of 33 feet per minute or 66 feet per minute in the forward direction, and 29 feet in the reverse.

The machinery housing is a specially designed unit, housing all driving and control machinery for crawler and elevator. All shafts are of turned steel, all gears cut steel, and all bearings bronze-bushed. This housing is dust tight, and partly filled with oil, which assures sufficient lubrication to all parts.

The drive from engine to machinery housing, and drives from machinery housing to crawler, are all roller chains, running on steel sprockets. All drives are protected by sheet steel guards. The drive to the elevator is composed of "SS" Class detachable links, with heat-treated side bars, case-hardened steel pins and bushings, and steel rollers. The wheels are made of steel, and the drive is equipped with a chain tightener.

The crawler is of channel and plate construction, riveted together, making a rigid housing for sprockets and idlers. The sprockets are of the Link-Belt patented self-cleaning type, made of steel, bronze-bushed. The treads are made of special heat-treated steel

cast in one piece, 11 inches wide, 11½ inch pitch, and run on cast steel idlers, also bronze-bushed, with large chambers for lubrication. Alemite lubrication is used throughout. A special design of shoes and sprockets guarantees self-cleaning crawler traction tread. And, finally, the rollers are large in diameter, and keep the bearings up—out of the dirt.

New Incorporations

Buffalo Gravel Corp., Buffalo, N. Y., 3,000 to 110,000 shares, of which 10,000 are \$100 each; 100,000 common, no par.

Bear Tavern Corp., Trenton, N. Y. (building supplies, etc.), 2,500 shares, no par. Alexander Trapp, George B. Teneyck and Thomas F. Riley, Trenton, incorporators.

Huntington Gravel & Supply Company, Houston, Texas. Capital \$100,000. Incorporators: L. L. Wilson, George I. Neal, Lena Davis, Nelle Depskey and Frank P. Slack.

Crescent Sand and Gravel Co., Yakima, Wash. Capital \$10,000. Incorporators: Henry A. McNeil, J. J. Ferrier and C. B. McNeil.

Hoosier Sand and Gravel Company, Terre Haute, Ind. Capital \$10,000. (Operate sand and gravel pits.) Directors: Maurice A. Berkowitz, Walter K. Ely, Milburn Richardson.

Consolidated Cement Corporation, Wilmington, Del. (Deal in cement of all kinds.) Capital \$20,000,000. (Corporation Trust Co. of America.)

A-One Cement Products Corp. Capital \$10,000. Incorporators: I. J. Kahan, O. Stolp, W. A. Vanness. (Attys. Vanness & Vanness, 220 Bway., Manhattan, N. Y.)

Interstate Sand & Gravel Co., Wilmington, Delaware. Capital \$150,000. F. L. Mettler, Wilmington, incorporator.

The L. & L. Coal Company, 5419 West Division St., Chicago, Ill. (Buy and deal in coal, oil, fuel, sand, gravel, building material, etc.) Incorporators: Henry Larson, Madeline L. Larson, Henry R. Larson. Correspondent: R. C. Holbrook, 343 S. Dearborn St., Chicago.

Northwestern Portland Cement Co., Seattle, Washington. Capital \$2,000,500. Incorporators: Abe Goldberg, E. A. Goetz and James R. Stirrat, Jr.

Lanning & Rhodes, Inc., 786 Broad St., Newark, N. J. (Deal in building supplies, etc.) Capital, \$125,000.

Cutting and Welding Torches

A full line of cutting and welding torches is displayed in a pamphlet recently issued by the Alexander Milburn Company. This company has spent 18 years in research and development of welding and cutting apparatus and the products are now so standardized that the component parts are interchangeable with equipment placed on the market ten years ago. The manufacturers claim their cutting torches pre-heat the oxygen and use a minimum amount of combustible gas. The torches have no small parts to get out of order and repairs are at a minimum as all parts are easily accessible from the outside.

The company manufactures combination cutting and welding torches, straight head cutting torches, machine cutting torches, water cooled machine torches, sheet metal, lead burning, extension and jewelers' torches.

Car Loadings

Loadings of revenue freight for the first nine weeks this year—that is, from January 1 until February 27, inclusive—totaled 8,108,459 cars, according to reports, just filed by the carriers with the car service division of the American Railway Association. This was an increase of 28,463 cars over the corresponding period last year and an increase of 182,370 cars over the corresponding period in 1924.

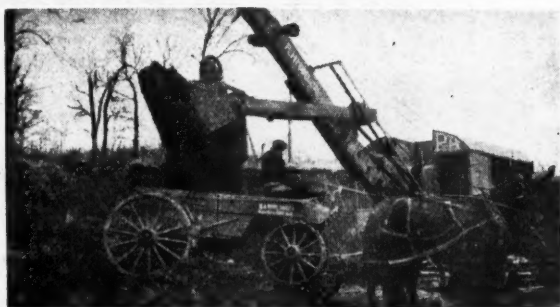
For the week ended on February 27, loading of revenue freight totaled 912,658 cars. Due to observance of Washington's birthday, this was a decrease of 19,085 cars compared with the preceding week. It was, however, an increase of 48,562 cars over the same week last year which also included a holiday, but a decrease of 31,856 cars compared with the corresponding week in 1924, which did not include a holiday.

Miscellaneous loading for the week of February 27 totaled 326,740 cars.

A comparison by weeks follows:

	1926	1925	1924
Jan. 2....	741,239	467,098	706,292
Jan. 9....	907,119	934,170	871,023
Jan. 16....	936,655	934,022	894,851
Jan. 23....	921,734	924,291	891,481
Jan. 30....	925,263	897,368	929,623
Feb. 6....	914,904	929,130	906,017
Feb. 13....	917,144	903,935	935,589
Feb. 20....	931,743	925,886	845,699
Feb. 27....	912,658	864,096	944,514

There Is Always a Best Way



Stripping the quarry of Independence Quarry Company near Kansas City. Loading Western dump wagons.

This quarry uses a steam shovel and Western dump wagons in stripping, and hauls rock in small Western dump cars.

Western dump wagons are particularly adapted to stripping operations that permit a wagon haul because, according to contractors

"The Western is the only dump wagon that will stand up under the pounding of a large shovel."

Strength is secured by steel-reinforcing where strength is needed most, keeping the wagon as a whole as light as possible and easy running. Western dump wagons are easy on the live stock.



Western

Western Wheeled Scraper Company

Founded 1877

**Earth and Stone Handling Equipment
AURORA, ILLINOIS**

1926 Handbook

Enthusiastically Received

The many enthusiastic "Thank You's and compliments, from men who should know, that have been received by the Publishers testify to the high appreciation by the field of the 1926 Pit & Quarry Handbook.

The fact that a copy of the Handbook was sent, free of charge, to every plant in the pit and quarry field throughout the country has brought many comments on the very practical nature and value of this gratuitous service.

If, perchance, there should be any operator of a plant who has not received one free copy, the Publishers will gladly send him a copy, free of charge.

While the distribution of one copy to each plant has nearly exhausted the edition, those plant operators who desire additional copies for members of their organizations, or such manufacturers and engineers who desire one or more copies, may purchase copies at \$5.00 each—as long as the edition lasts.

Many orders from operators for extra copies, and from others, were received before this edition was off the press and orders are coming in daily. It is hoped that those who most desire copies will act promptly.

Dewey to Build New Plant

The Dewey Portland Cement Company decided a few weeks ago to build a wet process cement plant about three miles west of Davenport, Iowa. The plant site covers about 220 acres and is on the bank of the Mississippi River. The site is crossed at the present time by the Chicago, Milwaukee and St. Paul and the Rock Island Railways.

There is an abundance of raw material which can be quarried to almost any depth. The deposit has been drilled to a depth of 200 feet at various points and stone of excellent quality is shown.

Plans have been made to install two large kilns immediately. The J. C. Buckbee Company of Chicago are in charge of plant design and specifications. The new plant is expected to be in operation by January, 1927.

The Million Gravel Co., Lake Cicott, Ind. Capital \$75,000. Incorporators: Floyd Million and Frank Million.

1.

Smooth inside—no rivets to wear nor to obstruct the flow of materials, allowing a power saving up to 30%.

2.

A high carbon steel wearing strip takes all the wear and greatly increases its service life.

3.

Easy to handle—one-fifth the weight of cast iron pipe—one-third the weight of wrought pipe.

4.

Lowest first cost—lowest installation cost—lowest ultimate cost.

5.

Has ample strength for carrying loads long distances between supports.

6.

Made in all sizes—4 to 30" diameter and of 18 to 10 gauge material.

7.

The spiral 4 ply seam strengthens the length and resists damage due to rough handling.

8.

Standard sizes shipped from stock—Plain, Asphalted, or Galvanized—any length up to 40'.



That's why you should use
Naylor Spiral Lock-Seam Pipe
for your dredge lines.

It saves you time and money—it outlasts other types of conveyance pipes. It is easier to handle, because it is lighter and guarantees a real saving in time required for installation.

Write us for prices and delivery quotation—our engineers are available for suggestions on lay-outs, pressure, capacities, and other questions.

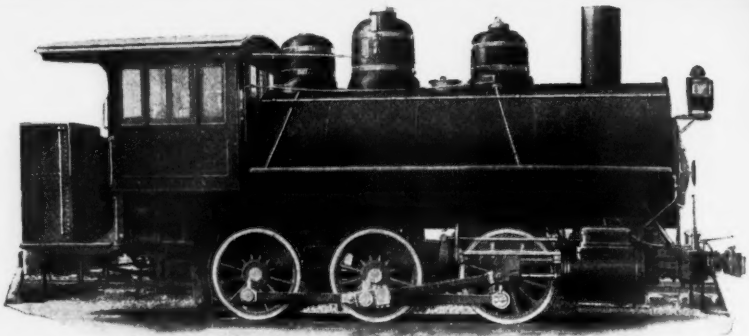
May we send a sample section of Naylor Spiral Lock-Seam Pipe for your inspection?

Naylor Spiral Pipe Company

1234 East 92nd Street

Chicago, Ill.

Naylor Spiral Lock-Seam Pipe



60 Ton Baldwin 19x24" 6-Driver, Saddle Tank; 180 lbs. steam Pressure; 44" driving Wheel Centers; 11'0" Wheel Base; Air Brakes; 1,500 Gallon Tank.
ENTIRELY NEW A.S.M.E BOILER BUILT BY BALDWIN LOCO. WKS. AND APPLIED IN 1921. COMPLETELY OVERHAULED—IMMEDIATE SHIPMENT.

Over Sixty Locomotives in Stock, Thoroughly Overhauled in Our Own Shops, Ready for Immediate Delivery, All Types, Rod and Geared, Narrow and Standard Gauge, 5 to 125 Tons.

ALSO

RELAYING RAILS

STEAM SHOVELS, LOCOMOTIVE CRANES, DUMP CARS, CAMP CARS, FLAT CARS, GONDOLA CARS, COACHES, ETC.

SOUTHERN IRON & EQUIPMENT CO.

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STEEL RAILS FOR SALE

Prompt shipment from stock.

All Sizes

For information and prices communicate with

SONKEN-GALAMBA CORP.

Kansas City, Kans., U. S. A. Kaw Station, Phone 9243 Victor

IMMEDIATE SHIPMENTS



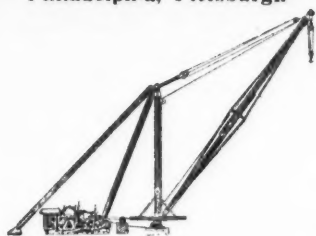
RAILS RELAY
NEW FROGS AND SWITCHES
TRACK ACCESSORIES

MORRISON & RISMAN CO.

INCORPORATED
BUFFALO, N. Y.

Gas or Electric Hoists and Derricks

Available for immediate shipment f.o.b. New York, Chicago, Philadelphia, Pittsburgh



GASOLINE OR ELECTRIC HOISTS

- Large quantity American double drum hoists with attached swinging gear, capacity 6000 lbs. on single line at 162 ft. per minute with—new 55 H.P. Climax gasoline engine—37 H.P. 220 or 440 volt, 60 cy. 3 ph., A.C. electric motor—35 H.P. 220 volt, D.C. electric motor—or without power for belt drive.
- 2—52 H.P. single drum Lidgerwood, with 220 volt, 60 cy., 3 ph., A.C. motor, complete with one winch head.
- 1—75 H.P. double drum Clyde hoist, capacity 10,000 lbs. on rear drum, 5,000 lbs. on front drum, with 220 volt, 60 cy., 3 ph. motor.

DERRICKS

Large quantity late model American Stiff Leg Derricks, mast 14x14x40 ft. booms 14x14x 60 ft., stiff legs, 14x14x50 or 60 ft. sills if desired, with 12 ft. steel bull wheel, for hook work or bucket operation.

Large quantity late model American Stiff Leg Derricks, mast 16x16x40 ft., booms 14x14x80 ft., trussed with hog rods, legs and sills 14x14 with 16-ft. steel bull wheel, arranged for hook or bucket operation.

Also several Guy Derricks, wood or steel, arranged for single line work or for operating clam shell bucket.

CRANES

- 1—15-ton O & S, 8-wheel M. C. B., 40-ft. boom, bucket operating.
- 1—O & S 7-ton Crane, 30-ft. boom, ¼-yd. clamshell bucket, traction wheels.
- 1—Byers Auto Crane, 30-ft. boom, ¼-yd. bucket, traction wheels, steam.

LOCOMOTIVES

- 1—Porter std. ga. saddle tank, 14x22 cylinders, weight 42 tons, like new, only one year of service, shop No. 6853.
- 2—7-ton, 24-in. ga., Plymouth, gasoline.
- 6—3-ton, 24-in. ga., gasoline. 3—Plymouth.
- 3—Whitcomb Fordson.

STEAM SHOVELS

- 2—3½-yd. Shovels with rock dippers; 1 on caterpillars, 1 on R.R. trucks.
- 2—Type "B" Erie Shovels, mounted on caterpillars; one with Crane Boom.
- 2—Thews on traction wheels, 1, Type A1, 1, Type 0.

CABLEWAYS

- 11—3 and 5-ton, Street Bros. (Howson) Cableways, complete with automatic dump buckets.

STEAM HOISTS

- 12—Three-Drum Hoists, with or without boilers. Sizes 10x12, 9x12, 9x10, 8¼x10 and 7x10, with separate swingers for derrick work. All makes.
- 54—Two-Drum Hoists, with or without boilers. Sizes 12x12, 10x12, 9x10, 8¼x10, 7x10, 6¼x10, 6x8, and 5x8. Can be equipped with holding drum for bucket work.

DRILLS

- 2—No. 3½ Keystone drills.
- 6—Model 21, Waugh "Denver" derrick drills.
- 8—Model 31, Waugh "Denver" column drills.

CRUSHERS

- 2—No. 9 McCully Rock Crushers; 1 Right and 1 left.
- 2—No. 7½ Kennedy Rock Crusher.

COMPRESSORS

- 1—2-stage, 950 ft. Sullivan, Class N.B. Compressor.
- 1—2-stage, 1500 ft. Sullivan, stationary Compressor.
- 2—Chicago Pneumatic Portable gasoline driven, on rubber-tired wheels, cap. 210 cu. ft.

Can offer several large steam shovels on railroad trucks and caterpillars.

Equipment Corporation of America

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360 Empire Bldg.,
Phone Grant 5148

CHICAGO, ILL.
1460 Reanoke Bldg.,
Phone Randolph 8588

PHILADELPHIA, PA.
660 Land Title Bldg.,
Phone Rittenhouse 5498

Machinery for Sale

Crushing Rolls

One 8"x5", two 16"x10", two 24"x12", one 30"x10".
Two 26"x15", one 30"x16", two 36"x16", one 54"x24".

Gyratory Crushers

Ones No. 3 Gates—One No. 4 Gates—Two No. 5 Gates.
Two No. 6 Gates & McCully—Two No. 7½ Gates & Austin.
Three No. 8 Gates & Traylor—One No. 9 Gates.

Jaw Crushers

Two 8"x14"—one 6"x20"—two 9"x15"—one 10"x20"—two 12"x24"—one 15"x30"—one 18"x36"—two 36"x48"—one 40"x42".

Rotary Crushers

Two No. 0, two No. 1, two No. 1½—One No. 2 Sturtevant Rotary Fine Crushers.

DRYERS—Two 3'x20', Three 4'x30', One 4½'x30', One 5'x40', Three 5½'x40', Two 6'x60', One 7'x60' and One 8'x80' Direct Heat Rotary Dryers. One 5'x25', one 6'x30', Two 8'x8' Ruggles Coles type "A" and One 4'x20' Ruggles Coles type "B" Double Shell Rotary Dryers.

KILNS—4'x40', 5'x50', 6'x70', 6'x100', 6'x120', 7'x100'.

Swing Hammer & Tube Mills—Fuller, Griffen, Hardinge and Raymond Mills.

W. P. HEINEKEN & CO., Inc.

Industrial Engineers
95 Liberty St., New York City,
Tel. Hanover 2450

FOR SALE

One 18B Bucyrus steam shovel, traction, thoroly rebuilt, now operating at Ottawa. One set Allis-Chalmers Type B crushing rolls, 42x16. Weight 37,000 lbs. One 9x15 Galena Blake Jaw Crusher with 2 fly wheels complete. One Universal Vibrating Screen, 4'x8'. Two Jeffrey coal crushers, 36"x18" on trucks. One 60"x18" Barber-Greene conveyor with belt. D. C. Motors. 50 and 10 H.P. Fairbanks. 10, 5, 3 and 2 H.P. G. E.

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CATERPILLAR

Cranes—Draglines—Shovels

- 2—Type "B" Erie Shovels with Crane attach.
- 1—Type "A" Erie shovel with Crane attach.
- 1—O&S, 12-ton Crane, Gas Power.
- 1—Marion 21 Crane with Dragline attach.
- 1—P&H No. 210, 48-ft. Boom, Gas Power.
- 1—Monighan, 1½-T Dragline, Diesel Engine.
- 1—P&H No. 206, Gas Shovel.
- 1—Monighan 3-T Walker 80-ft. Boom, 2½-yd. Bucket, equipped Diesel Engine.
- 1—Monighan 2-T Walker Type, 70-hp. Charter Engine, 70-ft. Boom, 2-yd. Bucket.
- 1—Monighan 1-T Walker Type, 40-ft. Boom, 10-ft. extension 1-yd. Page Bucket.
- 1—Bucyrus Class 24 with 115-ft. Boom and 3½-yd. Bucket, Steam Power.
- 1—Model 31 Marion Caterpillar, 1-yd. Dipper.
- 1—14-B Bucyrus Caterpillar ¾-yd. Dipper.
- 20—Various makes and sizes, R. R. and Trac. Wheel Type, from 1-yd. to 6-yd. cap. Send for complete list of equipment.

RENNOLDS EQUIPMENT COMPANY

36 West Van Buren Street CHICAGO

FOR SALE

1,000 cu. ft. 1-R. two stage Elec. Compressor.
No. 8K Gates Gyratory Crusher.
No. 5 Leyner Drill Sharpener.
10—I-R Jack Hammer Drills.
DELTA MINING COMPANY
Iron River, Michigan

FOR SALE

One A frame derrick car, complete with 35 H.P. Lambert three drum hoist, direct connected to boiler, swing engine, 1½ yd. clamshell bucket, 1300 ft. of cable, 60 ft. boom, 25 ft. mast, mounted on shoes for rollers, length overall 50 ft., width 14 ft. An A-1 outfit for digging gravel.
THE NORTHERN INDIANA SAND & GRAVEL CO., Wolcottville, Indiana

FOR RENT OR SALE

Thoroughly rebuilt type "B" Erie caterpillar or traction wheel, ¾-yd. steam shovel.
A Bargain in an 18-B Bucyrus, traction wheel steam shovel.
Southern Agents for McMyler-Interstate Company, Bedford, Ohio.

DEMPSTER EQUIPMENT COMPANY
Knoxville—Jacksonville—Lexington
"South's largest shovel dealers."

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No. 5 Austin Crusher with 45 ft. heavy duty elevator and 14 ft. screen, 40" diameter. 4 two-yard dump cars, single drum hoist, etc. Complete plant except power. Has only been used for 4,000 yards and guaranteed just as good as new. Bargain price \$2,800. Job cars.

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T. H. LETSON & CO.

Good Hudson Terminal Bldg. Clean
Used Equipment Business Methods

STEAM SHOVELS

- 1—¾-yd. type B Erie high lift, traction wheels.
- 1—¾-yd. type B Erie No. 1566 on Caterpillars.
- 1—¾-yd. type B Erie No. 1769 on Caterpillars.
- 1—¾-yd. Al Thew on Traction Wheels.
- 1—No. 4 Keystone Excavator No. 4296, with skimmer scoop and trench bucket.

HOISTS (Steam)

- 1—7x10 single drum, Skeleton Lidgerwood.
- 1—8½x10 three drum and boiler Lambert.
- 1—10x12 D. D. and Swinger Skeleton Lidgerwood.

HOISTS (Electric)

- 1—22 H.P. two drum Flory with 2Ph. 60C. 220V. Motor and Solenoid brake.
- 30—Separate Clyde Electric Swingers with 10 H.P. 3Ph. 60C. 220V. Motors, or without Motors.

DERRICKS

- 1—10 ton 80' boom 14"x14" Terry Timber Sulf Leg with 12' Bullwheel.
- 1—20 ton 70' boom Steel Guy (Erector's type.)

For Sale

MARION 36 SHOVEL

Full Revolving—Traction Wheels, 24' Boom, 16' Dipper Stick, 1¼ or 1½ yd. Dipper. Guaranteed first-class condition.

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USED EQUIPMENT BARGAINS

PIT AND QUARRY 117

Crushers #10, 9, 8, 7½, 6, 5, 4, 3,

Roll Crushers

84x72, 36x60, 54x24, 18x30

Jaw Crushers

22x52", 36x48", 42x48", 20x24", 15x36"

DISC CRUSHERS, 48", 36", 24", 18"

50 to 850 H.P. OIL ENGINES

HOISTS—STEAM AND ELEC.

3—3½ YD. SHOVELS

AIR COMP.—HOISTS—DERRICKS
DRAG LINES—LOCO. CRANES

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DUMP CARS

50—4-yd., 36" gauge, WESTERN, 2-way side Dump, new 1928, Heavy Duty, 4-pedestal, STEEL DRAFT BEAMS Box Girder Doors; re-built like new.

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1—OSGOOD HEAVY DUTY, full revolving, Shop No. 1124; new late 1923, ALL STEEL CATERPILLARS, A.S.M.E. boiler; ¾-yd. digger; HIGH LIFT; Boom Hoist; slightly used, overhauled, like new.

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1—7-ton capacity O. & S., full revolving Steam Crawler Crane, new 1923, A.S.M.E. boiler, ALL STEEL CATERPILLARS; 35 ft. boom, bucket operating; used six months, like new.

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92 ft. Ingersoll-Rand, ER-1, Belted.
355 ft. Ingersoll-Rand, ER-1, Belted.
355 ft. Ingersoll-Rand, FR-1, Steam
528 ft. Ingersoll-Rand, ER-1, Belt.
599 ft. Ingersoll-Rand, Imperial XB-2, Belted.
888 ft. Ingersoll-Rand, Imperial XB-2, Belted.
1190 ft. Ingersoll-Rand, Imperial XB-2, Belted.
1145 ft. Chicago Pneumatic OCB, Belt.
1400 ft. Chicago Pneumatic, OCB, Belt.
1500 ft. Ingersoll-Rand, Imperial XB-2, Belt.
1270 ft. Chicago, OCE Motor Driven, 3 phase, 25 cycle, 440 volt.
1308 ft. Chicago, OCE Motor Driven, 3 phase, 60 cycle, 2200 volt.
6—212 ft. Chicago Portable Oil Engine Driven Compressors.
Portable Gasoline Driven, Compressors.

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For Sale

1—10"x16", 36" gauge Davenport dinky.

1—18"x24", 50 ton switch engine.

1—9"x18" jaw crusher with elevator and screen.

1—No. 3 T. L. Smith gyratory crusher with Farquahr engine, elevator, buckets and screen. Practically new, only used on two small jobs.

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Latonia, Kentucky

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STD. GAUGE

25 Ton Lima Type 0-4-2, cyls. 12x16".

40 Ton Vulcan Type 2-4-2, cyls. 14x20".

Both Saddle Tanks, Steam Brakes, Automatic Couplers.

10—12-yard Western Air Dump Cars.

20—4 yard, 36" ga. Western Dump Cars.

100—40 ft. 60,000 lb. cap. Flat Cars.

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1—48x36" Traylor ak, manganese fitted.

1—No. 12-K Gates, some extras.

1—No. 7½-D Gates, manganese fitted.

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1—No. 5-K Gates, two heads.

3—Symons Discs—48, 36 and 18".

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1—No. 3F and 1—No. 2 F Telsmith Reduction.

CRANES

1—35 ton McMyler Model 6, 50' boom.

1—20 ton Browning, 50' boom.

1—O. & S. 12 ton, cat. gas, 40' boom.

7—Northwest Model 105, 40' boom, cat. gas.

1—P. & H. cat. gas., 30 ft. boom.

1—Erle, caterpillar, steam, 40' boom.

SHOVELS

1—Model 103-C Bucyrus, cat. also R. R. trucks.

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4—No. 248 Leyner-Ingersoll Drifters fitted for 1¼" Hollow Round Steel, 24" Feed, equipped with A-86 Tripods complete with 3 "C" weights. Used approximately 9 months.

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The following used 220 or 440 volt, A.C., 60 cycle motors.

3—7½ H.P. Cleveland ..1800 R.P.M.

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Electric 900 R.P.M.

4—50 H.P. Burke Slip

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Overhauled—Immediate delivery

1—36 Marion Caterpillar Shovel, 1½ yd. Bucket.	\$8,500
2—18 Ton, 36" Gauge Davenport Locomotives	1,650
1—14 Ton, 36" Gauge Vulcan Locomotive	1,350
1—10 Ton, 42" Gauge Davenport Locomotive	1,000
1—250 HP High Pressure Marine Boiler	1,500
1—200 HP High Pressure Marine Boiler	1,250
1—80 HP Scotch Marine Boiler	800
1—100 HP Steam Shovel Boiler	750
2—30 HP Single Drum Electric Hoists	900
1—100 KW Generator direct connected steam	650

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PIT AND QUARRY,
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10 Ingersoll-Rand X-70

Rock Drills

50% of new price

ARCHER ARMSTRONG, INC.
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Model 60 Marion Steam Shovel, R.R. trucks, 2½ yd. dipper, located Delaware, Ohio. Rebuilt at cost of \$3,500.00, not used since. \$1500.00 where is as is.

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Plants Designed and Equipped**HOOPER-MOMBERGER CO.**

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FOR SALE**

Rubber covered belt 6 and 7 ply. Length 300 feet. Width 36 inches. Head & Tail Pulleys. Take Up, Master Gear, Pinion & Bearings. Will sell entire outfit less than cost of new belt.

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RAILS

50 1½ yd. new V-shaped Steel Dump Cars in stock. Price \$100.00 each.
All sections, new and second hand rail; also portable track. Centrally located. Also Cars of all kinds.

Immediate shipment guaranteed
M. K. Frank

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An Unusual Opportunity

A Fairfield 48 ft. bucket elevator with 125 ft. drag conveyor. Can be bought in separate units if desired. All machinery is in excellent condition but for sale at a very fair price. This equipment must be moved.

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1—No. 6 McCully Gyrotory for
Farrell Jaw Crusher about
36x42.

E. J. LAVINO & CO.
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Steam Engine For Sale

Reeves tractor, locomotive type cross compound, rating—32 H.P. on draw bar, 120 H.P. on belt. Suitable for pumping sand and gravel. In good running condition. Will sell at a bargain.

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- 2—5x7 Steam Hoists & Boilers.
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- 5—12-in. Centrifugal Pumps.
- 4—4-Ton 36-in. Gauge Elec. Locomotives.

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FOR SALE**LADDER DREDGE**

Complete with screening for wash sand and gravel

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Eric Type B Steam Shovel, ¾ yard, Caterpillars, Marion Model 36 Steam shovel, 1½ yard, Caterpillars, 2 Davenport 36" gauge, additank locomotives, 18 tons, 30 Koppel 36" gauge, all steel dump cars, capacity 2 yds.

ATLANTA LOCOMOTIVE & EQUIPMENT CO.
Fourth National Bank Bldg., Atlanta, Ga.

FOR SALE

- 1—No. 7½ Austin Crusher, chilled iron fitted.
- 1—Model 60 Marion Shovel No. 1493.
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- 1—Model 79 Bucyrus Steam Shovel.
- 1—Model "O" New Revolving Shovel.
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RAILS**SWITCHES AND FROGS
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PITTSBURGH, PA.
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STEEL FABRICATORS
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Manufacturers of Diesel Oil Engines from
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120 acres best gravel lands in the west.
Deep gravel beds containing fine porcelain sands.
Exceptional location adjoining Mississippi River
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Standard Gauge

Gas or Steam, 20 to 40 ton. Send complete
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FOR SALE—SLIGHTLY USED

Leather Belting

Various lengths and widths in excellent
condition. Our prices will effect a big
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Bargain—Steam Shovel

Marion 21 full cats. 3/4-yd. built 1921. A.
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price of \$3,000.00 F. O. B.

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Northwest 104 Combination. Late Model.
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Insley 3/4 yd. Shovel. Cats. Used 6 mos.
Thew Model 1, Comb. Traction Wheels, \$2750.
Thew 3/4 yd. Shovel. Traction Wheels. Over-
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Bucyrus 14B. Now in operation. \$2,000.
Indust. 12 ton Loco, Crane, 50' boom, electric.

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60 ton 6 wheel Switcher, 1st class.
39 ton Shay. Built 1921.
34 ton 2-6-2 Saddle Tank, built 1922.
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12 ton Whitcomb Gas, 36" gauge.

HOISTS AND DERRICKS

Hoist, 10"x12", 3 drum, with boiler
Derrick 30 ton, stiff leg, 100' boom.
Derrick 15 ton, guy, 100' boom

JAMES WOOD

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Telephone Wabash 1418

QUARRY EQUIPMENT

- 1—GATES No. 8; 7 1/2; 5; 4; 3 Gyrotory
Crushers.
- 1—AUSTIN No. 7 1/2; 5; 2 Gyrotory Crush-
ers.
- 25—Quarry Cars, End Dump, all steel, 36"
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Michigan Std. 150-lb.
- 1—GARDNER 9x10 Belt Driven Compressor.
- 1—INGERSOLL-RAND 10x12 Belt Driven
Compressor.
- 1—INGERSOLL-RAND, Class "0"; Cross
Compound, Steam, 1,600 Ft.
- 1—McMyler-Interstate, Type "B" Locomo-
tive Crane, 25 ton.

MORIARTY BROTHERS

208-12 Knapp St. Toledo, Ohio

**Wanted
Crusher Salesman**

One of the Oldest nationally known
manufacturers has an opening for an
experienced Gyrotory Crusher sales-
man. Excellent compensation and
unusual possibilities for advance-
ment.

Reply, giving full particulars as to
age, with whom now and previously
employed, present and former duties,
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Advertise Your

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SEAVERNS SERVICE BINS

for maximum efficiency in loading trucks and speeding up deliveries from yard to customer.

James B. Seaverns Company
Engineers, Manufacturers
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TRULY there is much in a name that has taken 183 years to make.

INSTALL Manganese steel wearing parts and note the

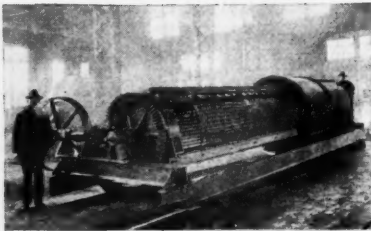
SAVING in repair bills and operating costs.

CONFIDENCE in your equipment will relieve you from worry.

ONLY ONE steel is called Tisco. Insist on it.

**Taylor-Wharton
Iron & Steel Co.**
HIGHBRIDGE, N. J.

Hardinge Stone Screen



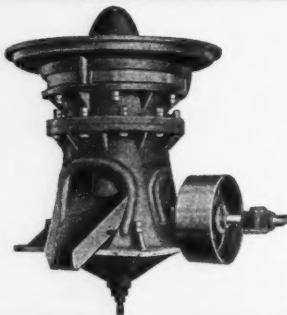
Extra heavy construction Designed for severe usage. Dust jackets supplied if desired.

Write for bulletin No. 20

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York, Pa.**

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Newhouse Bldg.
Salt Lake City



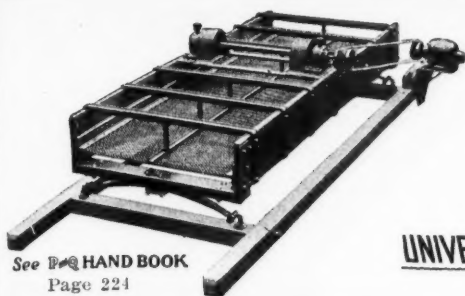
AUSTIN Gyrotory Crushers

Portable and Stationary Plants

Capacities, 5 to 300 tons per hour

Catalog 29Q tells the whole story. Write for your copy today.

AUSTIN MANUFACTURING CO.
NEW YORK CHICAGO SAN FRANCISCO



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Page 224

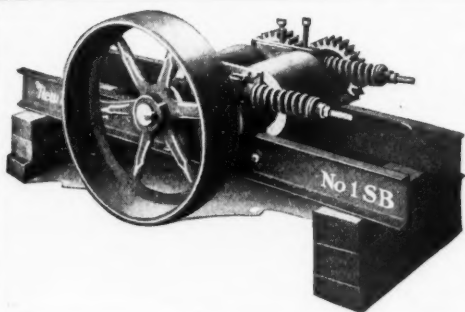
Universal Vibrators

For the very highest screening efficiency with the lowest maintenance cost.

Write for Descriptive Catalog
Today

UNIVERSAL VIBRATING SCREEN CO.

MACHINE — — WISCONSIN



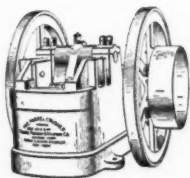
NEW HOLLAND ROLL CRUSHERS

are suitable for both primary and secondary crushers. They are built in three sizes and are ideal for tailing crushers or reducing gravel for concrete or block material. Our 16" diameter heavy duty rolls take in large pieces and make 1" and more reduction.

Write for complete catalog describing fully our Jaw Crushers, Hammer Crushers, Roll Crushers, Elevators, Conveyors, Screens, etc.

New Holland Machine Co.

Franklin St.
New Holland, Pa., U. S. A.



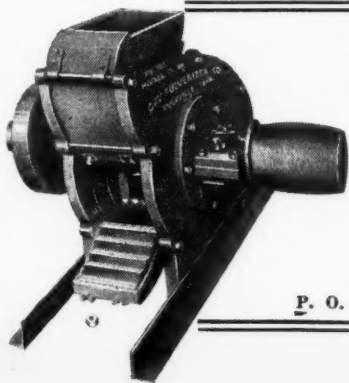
"FARREL" CRUSHERS

—World Famous—

Thousands in use on the hardest rock. Built in all sizes, 6"x3" to 60"x48". Complete rock crushing plants designed and equipped, also sand and gravel, washing and screening plants.

Send for latest bulletin E.

Earle C. Bacon, Inc., Engineers, 26 Cortlandt St., New York



10,000 Tons Without A Single Repair Part

"We have put 10,000 tons of stone through this machine since we bought it from you four years ago," says the Southern States Lime Corporation of Crab Orchard, Tenn. "We have not had occasion to buy a single spare part since the machine was installed."

The installation of a second Day Patented Pulverizer in this plant speaks for itself. Better write for further information.

Day Pulverizer Company, Inc.

P. O. Box 918,

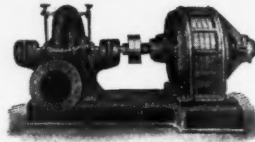
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HYDRAULIC DREDGES
6" to 12"

Designed and Built

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Single
Stage
High
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Capacities 25 to 4,000 Gal-
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**Pumps for All Purposes
ECONOMY PUMPING
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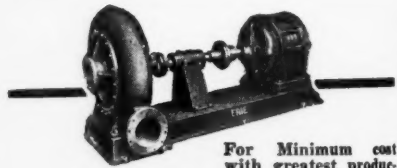
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**Perforated Metals and
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Material in Stock
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For Minimum cost
with greatest produc-
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Powerful Suction High Velocity
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Owen Buckets
INSURE A BIGGER DAY'S WORK

GUARANTEE
These Chamberlain Buckets are absolutely guaranteed to do more
work than any other bucket of the same weight and capacity.

THE OWEN BUCKET COMPANY
508 Rockefeller Building, Cleveland, Ohio
1926: Los Angeles, Memphis, Milwaukee, New York, Philadelphia, Toronto, St. Louis, St. Paul, Wash. D. C.

**BAY CITY
ONE MAN EXCAVATOR**

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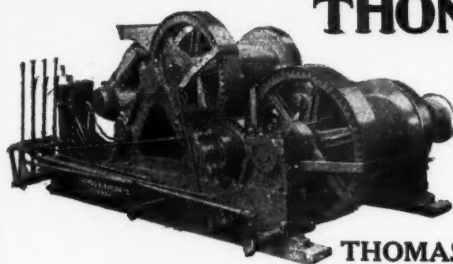
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You should have
this new catalog
describing the
"one man" ex-
cavator. The In-
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**HALF YARD
Shovel-Crane.**

See Ad. last
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THOMAS HOISTS



For Slackline Cableways, Drag Scrapers or any other class of service where two speeds and two capacities are required.

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THOMAS ELEVATOR COMPANY
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Uniform Product—Low Cost



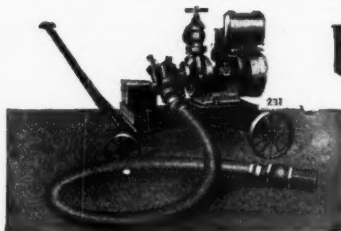
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Gruendler Pulverizers are built to perform. Ask us to show you.

Stationary or Portable Capacity 1 to 50 tons per hour.

Write for Booklet, "Folks & Field Need Lime."

Gruendler PATENT CRUSHER & PULVERIZER CO.
First & Franklin, St. Louis, Mo.



PENNS VANIA

A compact powerful portable pumping outfit for contractor's use.

Pennsylvania Pump & Compressor Company
Main Office and Works: Easton, Pa.



The "CLIPPER"

late improved Blast Hole Drill. The "CLIPPER" predominates, has stood the test, and is approved by critics. Furnished also in the round wheel.

(Established 1842)

THE LOOMIS MACHINE CO.

15 Market St., Tiffin, Ohio



FOR any kind of operation in sand, gravel, rock or other pit material where uninterrupted day-in-and-day-out production is a vital factor you can always depend upon

Marion Power Shovels

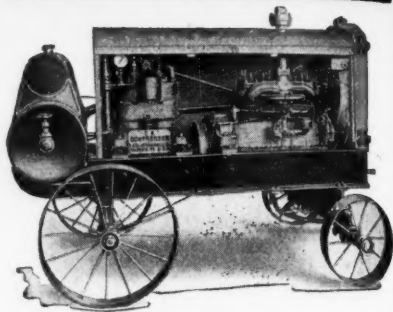
Electric-Steam-Gasoline-Electric

For full particulars regarding all types and sizes, write to shovel headquarters



MARION STEAM SHOVEL CO.
Marion, Ohio

G.L.I.



O. K. Compressors

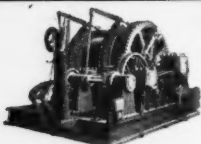
High Capacity—Low Price

Both gasoline and electric types are strong, compact, easily accessible for adjustment or repair, easy starting and very reasonably priced.

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Box 305, Columbia, Pa.

FLORY



Building
Hoists For
A
Half-Century

When any company can serve the trade for fifty years—it's product must surely stand the test of time. Suffice it to say that FLORY Hoists have more than made good—you'll find them in use the world over.

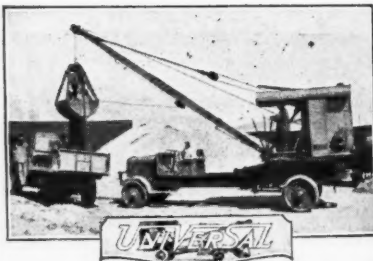
Flory also builds cableways, dredging machinery, and hoists for slack line excavators and drag scraper operations.

S. FLORY MFG. CO.
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Sales Agents in Principal Cities



HOISTS

20 or 3?



20 mins. to load this truck by hand—cost \$2.00.
3 mins. to load it with a Universal Crane—cost 30c.

Universals give you the difference as profit—plus truck mobility to speed from job to job. Universals are 5-ton full circle swing cranes—they dig with ½ yard clamshell or dragline.

For further Universal Money Making facts wire or write for

BULLETIN 283

The Universal Crane Co.
943 Sweetland Bldg., Cleveland, O.

IOWA SAND & GRAVEL CORPORATION
WHOLESALE BUILDING MATERIAL
CLEAN RIVER PRODUCTS

OSKALOOSA, IOWA February 24th, 1926.

Recd. MAR - 1926
New York
By
Date

Eagle Iron Works,
Des Moines, Iowa.

Gentlemen:

Just one year ago, we started construction work on our new sand and gravel plant near Eddyville. It was necessary that we adopt a washing system which would insure the elimination of the sticks and coal ever present in Des Moines river material. Also, we had to consider the occasional mud streaks in our deposit.

After a thorough investigation, we decided to purchase EAGLE washers to do this work. Three were bought and installed, one washer being assigned to each of our three gravel sizes.

These washers were operated during the three months last fall through which our new plant was used, and they have proved their worth to us. They not only remove the light particles such as sticks and coal, but, due to the nature of their operation, are very effective in the breaking and grinding up of mud and clay balls.

It is our intention to increase our capacity somewhat for this coming season, which means that we are going to need some additional washing capacity. You may, accordingly, enter our order for TWO additional EAGLE WASHERS, same to be shipped at once to our Eddyville plant. Kindly hurry them, sending invoice to this office.

Very truly yours,
IOWA SAND & GRAVEL CORPORATION
W. J. Clark
Supt. & Treas.

HED-3

Write Dept. K for Your Copy Descriptive Bulletin

PROOF!

Ask any of these representative users

- Capital City Sand Co., Des Moines, Iowa.
- James Horrabin & Co., Des Moines, Iowa.
- W. T. Hardison Co., Nashville, Tenn.
- Hawkeye Sand & Gravel Co., Des Moines, Iowa.
- T. B. Gatch & Sons, Baltimore, Md.
- Brown Huffstetter Mat'l Co., Indianapolis, Ind.
- R. E. Carr, Ames, Iowa.
- Ohio Valley Sand & Gravel Co., Bellaire, Ohio.
- Iowa Sand & Gravel Corp., Oskaloosa, Iowa.
- Cape May Sand Company, Cape May, N. J.
- Frank Donason, Maquon, Illinois.
- Des Moines Sand & Fuel Co., Des Moines, Iowa.
- General Mica & Clay Co., Franklin, N. C.
- River Sand & Gravel Co., Winona, Minn.
- Ashley Lumber Company, Hamburg, Ark.
- Howard Kenyon Dredging Co., Houston, Texas.
- Ashtabula Cement Prod. Co., Ashtabula, Ohio.
- Greenville Stone & Gravel Co., Memphis, Tenn.

EAGLE IRON WORKS
DES MOINES, IOWA

Elevator Buckets

Since 1880, when Salem Buckets were awarded First Premium for superiority, no other make of bucket has approached the Salem in quality, long wear and unusual service. It is made in many different sizes and gauges of steel ranging from 24 gauge to 6 gauge, and is adaptable for handling materials of practically any size, shape or weight.

Our ability to furnish special buckets made up in accordance with your specifications enables us to offer excellent service and prompt delivery.

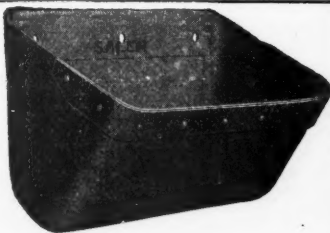


Fig. 1081. Reinforced edge. Particularly suitable to light or medium gauge buckets for handling abrasive or otherwise difficult material.

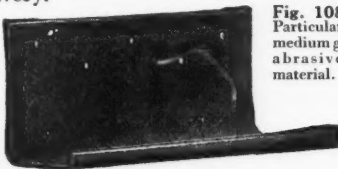


Fig. 1076. Flat Bottom Open End Shelf Bucket. For handling wet, sticky substances that will not discharge readily from other styles of buckets.

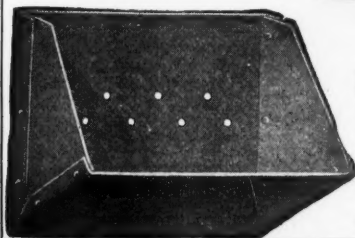


Fig. 133. Acute Heel Shelf Bucket. A heavy duty bucket especially adapted for handling coal, stone, cement, ores, etc. May be attached to chain or belt.

Write for Catalog 3625

MULLINS BODY CORPORATION
Successor to W. J. Clark Co.
106 Mill Street Salem, Ohio

Economical,
Hard Hitting
WOOD

Experienced help is not needed for Wood Drills. They are fool proof.

WOOD DRILL WORKS

Makers of



Efficient and Fool Proof
Hammer DRILLS

All parts are made of highest grade materials. The Wood has unusually rapid piston action. Let us send you full information.

30-36 Dale Ave., Paterson, N. J.

Hammer Drills and Piston Drills

For Separating Dry Ground Materials

80 Mesh to 350 Mesh

GAYCO CENTRIFUGAL SEPARATORS

Six Sizes—30 Inch to 14 Feet Diameter

RUBERT M. GAY COMPANY, Inc. 114 Liberty St., N. Y.

Crushing and Grinding

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Old Equipment Modernized

Properties Examined

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Cape Girardeau, Mo.

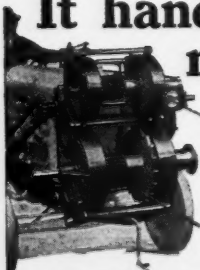
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Electric Power Transmission

Power Plants

Waste Heat Boilers

**It handles stone, sand and gravel
more economically**



This new hoist cuts the cost of material handling immensely in sand and gravel pit and quarry work. It operates drag line scrapers and furnishes quick, cheap power for all kinds of hoisting and pulling operations. Being automotive, it goes anywhere under its own power. Completely controlled from Fordson driver's seat. Write for free Hoisting Manual.

Willamette Iron & Steel Works,
Portland, Oregon, U. S. A.

Allison
AUTOMOTIVE
HOIST

For the Fordson

BUILT BY WILLAMETTE

The HUSKY DREADNAUGHT



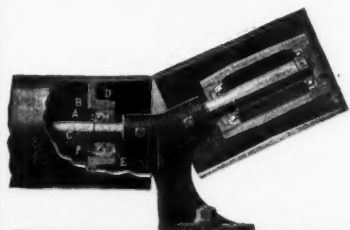
A High-Powered Clamshell

More power to you if you operate with a Blaw-Knox Dreadnaught Bucket, because it is built for **power**. It will work with equal facility in general service or hard digging because it is built from the huskiest materials by **Master Bucket Builders**. And it is *Absolutely Guaranteed*.

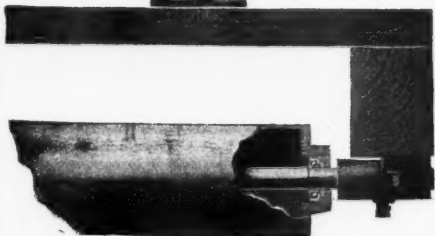
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652 Farmers' Bank Bldg., Pittsburgh, Pa.

ABSOLUTELY GUARANTEED BUCKETS



Conweigh Ball-Bearing Idlers



- 1—Reduce Friction
- 2—Reduce Resistance
- 3—Decrease Power Consumption
- 4—Give Maximum Conveyor Volume

They are of durable hardened steel construction and are easily accessible for lubrication.

May we help you with your problems?

THE CONVEYING WEIGHER COMPANY

90 West Street

ENGINEERS & CONTRACTORS

New York

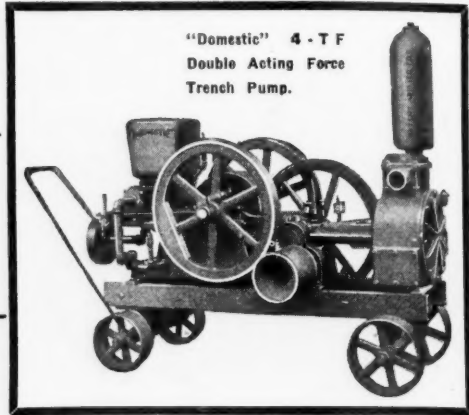
Handles Dirty, Muddy, Sandy Water Easily

What's more it handles it without wear. It's built that way with a plain cylindrical bronze plunger that will withstand harder service than the ordinary type of unwatering pump.

DOMESTIC TRENCH FORCE PUMP

will remove all the water that collects around the quarry and discharges it through a pipe or hose line without odor or slop-page.

The "Domestic" Double Acting Trench Force Pump furthermore, has maximum capacity with minimum bulk and weight—is quiet running and very strong.

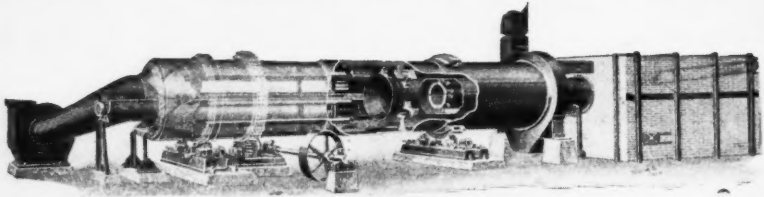


DOMESTIC ENGINE & PUMP CO. MANUFACTURERS

SHIPPENSBURG,

PENNA.

BUCKEYE DRYERS FOR SAND — ROCK — COAL — CLAY



Buckeye Type B Dryer
Patented

The patented inner tube is responsible for the unvarying success of Buckeye Type B Dryers.

DIRECT-INDIRECT FIRED USING COAL, COKE OR OIL
RUGGED CONSTRUCTION—HEAVY DUTY SERVICE

ALSO

BUCKEYE "SPECIAL" DRYERS

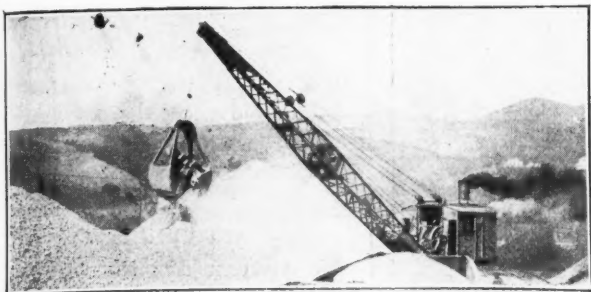
Semi-portable—Self-contained—Oil-fired—Direct Motor Drive. We ship the SPECIAL dryer assembled complete; set it on two concrete piers and it's ready to operate.

THE BUCKEYE DRYER COMPANY

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QUICKER, CHEAPER, BETTER PROFITS
 THESE ARE THE RESULTS OBTAINED BY THE VARIOUS
 INDUSTRIES USING
OHIO LOCOMOTIVE CRANES



The OHIO
 IS CON-
 STRUCTED
 OF
 90% BASIC
 OPEN
 HEARTH
 STEEL
 CASTINGS.

CAPACITIES
 15 TO 40
 TONS

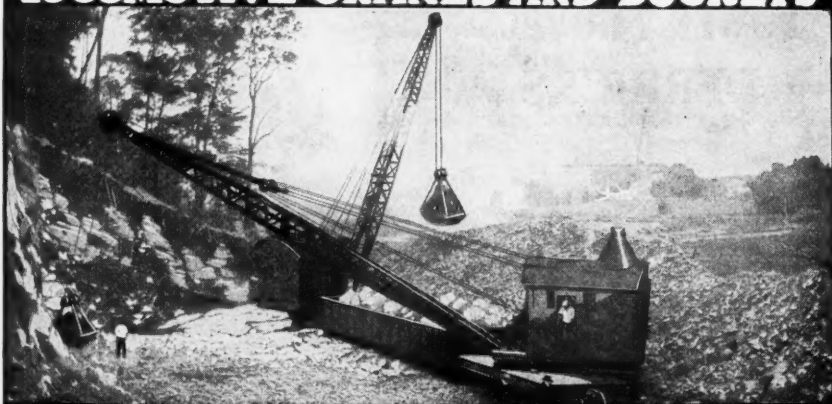
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ELM ST., BUCYRUS, OHIO

CHICAGO OFFICE, RAILWAY EXCHANGE BLDG.

NEW YORK, 30 CHURCH ST.

BROWNING
LOCOMOTIVE CRANES AND BUCKETS



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FOR
 DRAG LINES
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Use

SPARTA DRILLS

And Save Money

Economical in

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Repairs
 and
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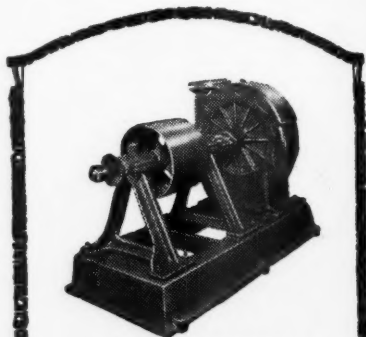
FAST DRILLING

We make a complete line for
 Well and Quarry drilling

Write for latest circular

BURKHARDT CO.

Successors to Sparta Iron Works
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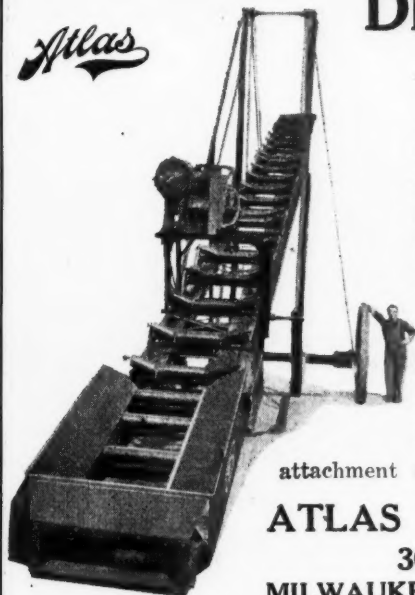


LIGHTNING PUMPS

Improve the market value
 of sand or gravel.
 No matter whether you
 are a large or small oper-
 ator we have a size adapt-
 ed to your needs.

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 KANSAS CITY, MISSOURI

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DEPENDABILITY

—Minimum Cost

Atlas Conveyors are not only dependable in all their operations—due to their simple, correct design—but also widely adaptable to handling all kinds of loose as well as bulky materias. And they operate at minimum power cost. The Atlas is electric motor or gasoline engine equipped.

Send for our latest bulletin on Atlas Conveyors. We can greatly assist you in choosing a type to fit your peculiar needs. Atlas Portable Conveyors are built in lengths from 15 to 100 ft., with either 14, 16, 18 or 24-in. belt. They can also be furnished with shaker screen

attachment as well as screening chute.

ATLAS ENGINEERING CO.

3007 Galena Street

MILWAUKEE,

WISCONSIN

SPEARWELL MOGUL LOADER

A Strictly One Man Machine

CAPACITY $1\frac{1}{2}$ to $2\frac{1}{2}$ CU. YDS. PER MINUTE

Weight 14,000 lbs.

Equipped with positive and efficient excavating, feeding and cleanup device.

Clears path 8 feet wide.

Guaranteed to excavate harder material and to clean up better than any loader of its kind on the market, bar none.

40 H.P. 4 cyl. Heavy Duty Buda Motor.

Positive self-cleaning track. 1500 square inches of bearing surface, less than 10 lbs. load per square inch.

Digging and crowding speeds 4 and 20 ft. per minute. Traveling speeds $\frac{1}{2}$ to $2\frac{1}{2}$ miles per hour.

Digging position quickly and easily adjusted and absolutely maintained by special grade control shoe.

Swivel chute controlled from operator's platform, permits loading in any position.

Write for literature and prices on Spearwell Loaders—a size for every need.



SPEARS-WELLS MACHINERY CO.

Manufacturers of SPEARWELL CONSTRUCTION AND MAINTENANCE EQUIPMENT

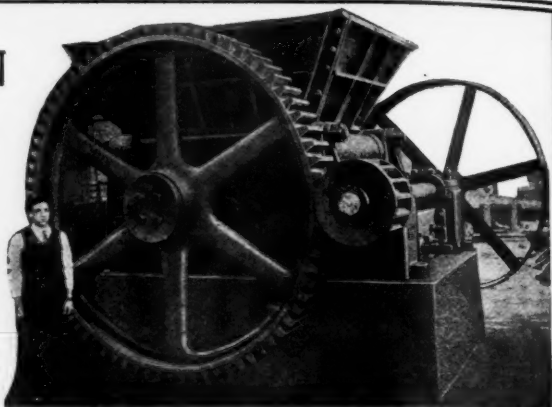
Oakland, California

McLANAHAN

Single Roll

CRUSHER

*STANDARD
SINCE 1894*

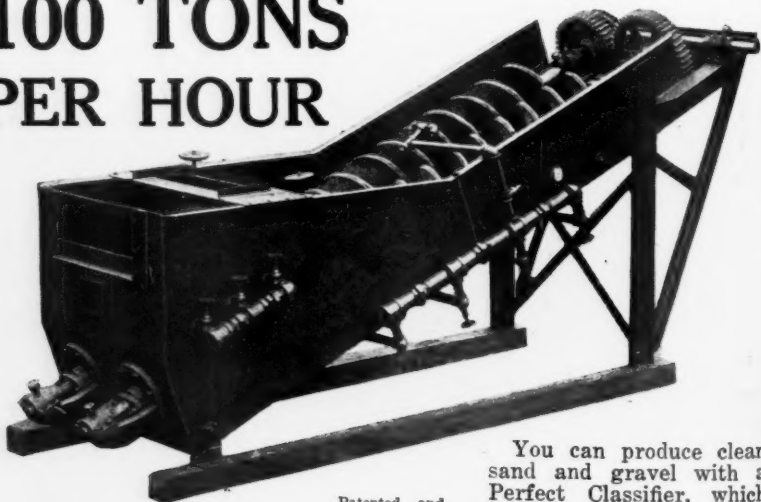


Quality and Dependability in Primary and Secondary Crushing. Simple in construction. All parts accessible, wide range of Output; Economical.

We also manufacture Screens, Washers, Elevators and Special Machinery. Send for full information.

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HOLLIDAYSBURG, PA.

100 TONS PER HOUR



Patented and
patents pending

You can produce clean
sand and gravel with a
Perfect Classifier, which
eliminates rejects.

PERFECT CLASSIFIER COMPANY
105 FIRST AVE., SOUTH NASHVILLE, TENN.



WOVEN MANGANESE STEEL SCREENS

Highest Efficiency—Greatest Economy—Longest Life



Note Face of Screen is flat

Both rods
crimped pre-
venting dis-
placement.



Enlarged section through centre of mesh.

Note closed
double locked
mesh.

The Crimping is all on one side of screen. Makes wearing side smooth and flat. Will handle 50 to 100% more material than perforated plate.

Made in all shapes and sizes—Flat, Rolled to Circles or Cones.
To Fit ANY Revolving, Shaking or Vibrating Screen.

Manganese Steel Forge Co.

Richmond & Erie Ave.,
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Manufacturers of "ROL-MAN" Rolled and Forged Manganese Products

The Armstrong System of Blast Hole Drilling

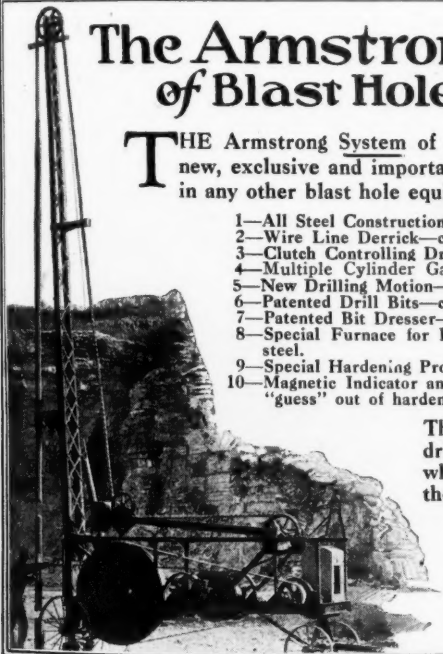
THE Armstrong System of Blast Hole Drilling embodies ten new, exclusive and important features which cannot be found in any other blast hole equipment!

- 1—All Steel Construction—unbreakable, fireproof.
- 2—Wire Line Derrick—cuts cable costs 75%.
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- 4—Multiple Cylinder Gas Engine—Dependable power plus.
- 5—New Drilling Motion—more blows per minute.
- 6—Patented Drill Bits—cut faster, eliminate fishing jobs.
- 7—Patented Bit Dresser—easily operated by unskilled labor.
- 8—Special Furnace for Drill Bits—heats properly, improves the steel.
- 9—Special Hardening Process—increases life of drill bits.
- 10—Magnetic Indicator and Improved Chemical Solution—take the "guess" out of hardening bits.

This improved method reduces your drilling costs and explains the reason why the big operators are installing the Armstrong System.

Let us tell you more about it.
Full details, specifications and
proof of performance sent free.
Write us NOW—today—sure.

Armstrong Manufacturing Co.
103 Chestnut St. Waterloo, Iowa



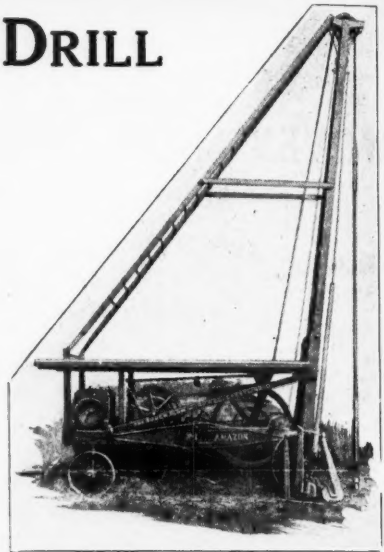
The AMAZON DRILL

*Cuts Rock on a
Cut Cost Basis*

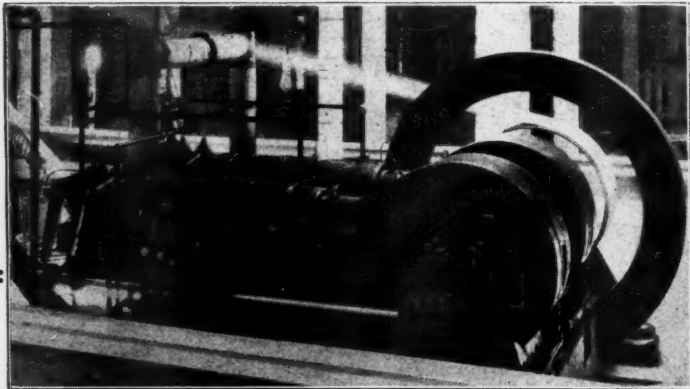
In planning your quarrying operations give careful thought to your drilling cost.

A new drill may prove an economical factor. Our engineering department will be glad to go into your problem with you.

Write for Drilling Bulletin



THE BURCH PLOW WORKS CO.
CRESTLINE, OHIO

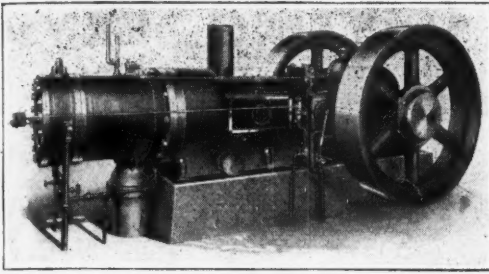


A Typical McEwen Installation

The illustration above shows the Semi-Diesel Type H Four Cycle Crude Oil Engine. It burns fuel oil of 26° gravity or higher and exhausts burnt gases completely before taking a charge. A highly efficient unit that is economical and quick starting.

McEwen Brothers

Wellsville, N. Y.



**ECONOMY
PLUS
RELIABILITY**
in a
"PRIMM"
Oil Engine

The "PRIMM" offers these and other advantages to the Quarryman who is using either steam or electricity. Made in two types, the type "S" being shown below. Proof of "PRIMM" saving is yours for the asking. Better, still, secure this proof from "PRIMM" owners in your own neighborhood.

the **POWER**
MANUFACTURING CO.

706 Cheney Ave.

Marion, Ohio

AUTOMATIC AERIAL TRAMWAY
The Air Way - The Short Way
The Low Way - The Right Way
To handle Tonnage of Mine or Quarry
Let Us Demonstrate

INTERSTATE EQUIPMENT CORPORATION
25 Church St. New York City

DIAMOND HOISTING SERVICE

Meets Every

Hoisting

Requirement

DIAMOND

*Single and Double Drum
Electric Hoists*

*In Sizes Up To
300 Horse Power*

Write for full information

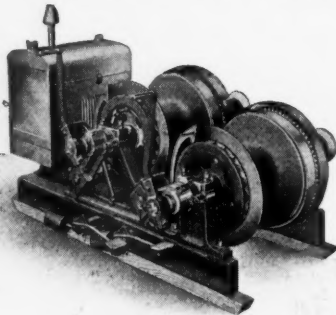


DIAMOND MACHINE COMPANY

MONONGAHELA, PA.

COOKE-WILSON ELECTRIC SUPPLY CO., SELLING AGENTS
Pittsburgh, Pa. Charleston, W. Va.

"O. & S." Gasoline Hoists



We build a Standard Line of Gasoline Hoists which are noted for their Reliability and Strength. They are built with Single, Double or Triple Drums and with or without Boom Swinging Attachment. These Hoists are built in six sizes, with a capacity of 425 to 5000 pounds on a single line.

Write for Bulletins Nos. 262, 269 and 270.

ORR & SEMBOWER, Inc.
READING, PENNA.

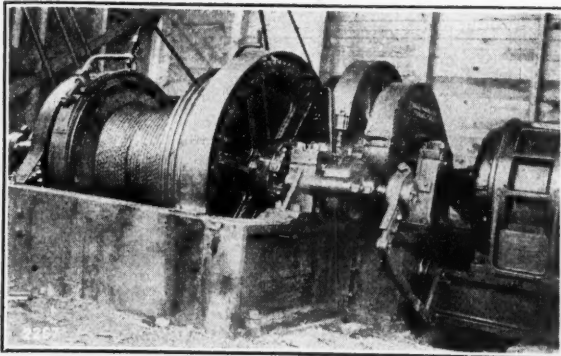
Established 1885

50 Church St.
NEW YORK CITY

208 N. Clinton St.
CHICAGO, ILLINOIS

LIDGERWOOD HOISTS

Electric Steam Gasoline



STRENGTH
That stands severe working strains.

POWER
That gives good digging.

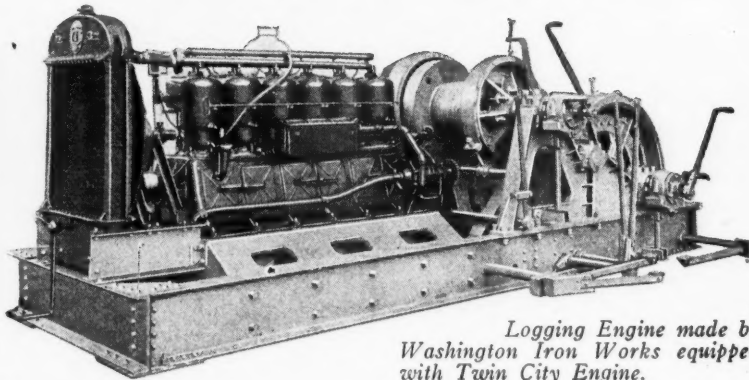
SPEED
That gives capacity.

**LIDGERWOOD
DRAG LINE
EXCAVATOR
HOISTS** have all these good qualities.

LIDGERWOOD MFG. CO., 96 Liberty St., New York

Chicago; Pittsburgh; Philadelphia; Columbus, O.; Los Angeles; Seattle; Tacoma; Portland, Ore. Brown-Marx Bldg., Birmingham, Ala. *Sales Agents:* Norman B. Livermore, San Francisco; Woodward Wight & Co., Ltd., New Orleans, La.; John D. Westbrook, Inc., Norfolk, Va.; Cameron & Barkley Co., Jacksonville, Miami, Tampa, Fla. Riechman-Crosby Co., Memphis, Tenn. Canadian Allis Chalmers, Ltd., Toronto. *Foreign Offices:* Sao Paulo, Brazil; Rio de Janeiro, Brazil; London, England.

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*Logging Engine made by
Washington Iron Works equipped
with Twin City Engine.*

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Minneapolis Steel and Machinery Co., Minneapolis, Minn.
Heavy Duty Engine Manufacturers since 1903

"BUILT TO DO THE WORK"

Better Bearings

Heavy,
well-finished,
durable



The
Caldwell line
is complete

H. W. CALDWELL & SON CO.

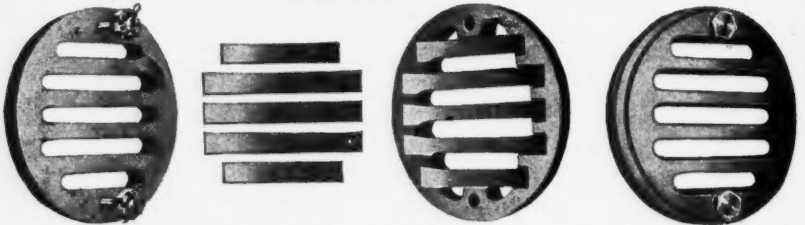
LINK-BELT COMPANY, OWNER

Chicago, 1700 S. Western Ave.; New York, 2676 Woolworth Bldg.; Dallas, 810 Main St.

CALDWELL

Worthington FEATHER Valve Compressors

(Reg. U.S. Pat. Off.)



♦ ♦ ♦ FEATHER Valve disassembled ♦ ♦ ♦ completely assembled

EXPERIENCE has shown that the FEATHER valves used in all Worthington compressors, have stood up for 300,000,000 strokes or more, corresponding to a service of from three to five years. This remarkable life is largely due to the fact that Worthington FEATHER valves give perfect contact without destructive impact.

The only moving parts are simple strips of steel which may quickly be

renewed for a few cents. Other distinctive features of Worthington FEATHER valve compressors are fully described in bulletins which will be gladly sent upon request.

WORTHINGTON PUMP AND MACHINERY CORPORATION

115 BROADWAY NEW YORK CITY
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Marks the Highest Development in the Art of Magnetic Separation

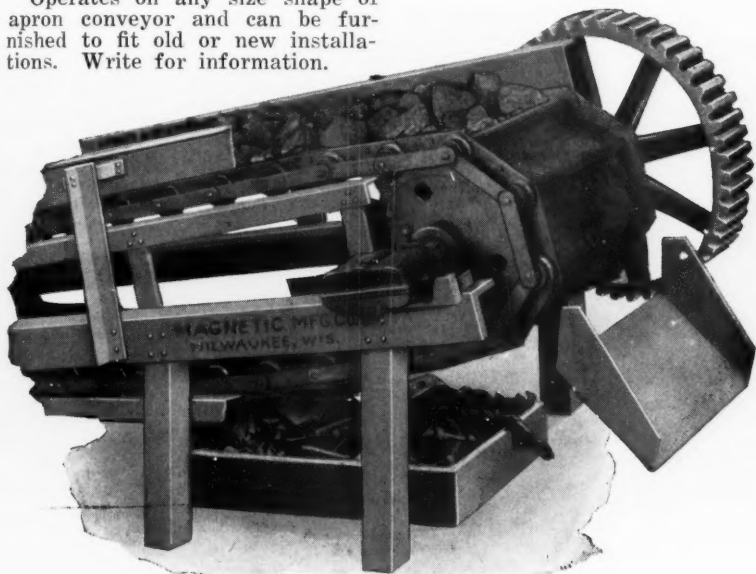
Owing to its improved construction along lines of correct engineering, the High Duty Magnetic Apron Pulley marks the greatest advance in twenty years in the art of Magnetic Separation. The

"HIGH DUTY"

Magnetic Apron Pulley

is designed to give best results in extracting all sorts of tramp iron from coal, ore, rock or foundry sand handled in large capacities and at considerable depth.

Operates on any size shape of apron conveyor and can be furnished to fit old or new installations. Write for information.



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MAGNETIC MANUFACTURING CO.

201 24th Ave.

Milwaukee, Wis.

H I G H D U T Y
Magnetic Separators



THE INSLEY EXCAVATOR

Built to Do the Work Which a Large Shovel Cannot Do—PROFITABLY

TURNING EXPENSE INTO PROFIT

THE Insley Excavator will do a number of different jobs well and economically. Comparatively speaking, it is light, and is equipped with extra large full-crawlers. Therefore it gets itself around over any kind of soil, and in and out of places where a larger machine cannot go. It is sturdily built, and has ample power, and will dig any sort of material. In short, it has all the operating advantages of a large machine reduced to a smaller scale, without losing the big advantage of a large power excavator, namely, low cost excavation.

As an example, the Big Bend Coal and Clay Company have strip mines near Centerpoint, Ind. They operate some of the largest steam shovels built in stripping the overburden from the coal deposits. This overburden contains many useful varieties of clay, such as

fire clay, brick clay, etc. The result is that they have a multitude of small rehandling and excavating jobs which cannot be handled economically with a large machine and at the same time are too bulky to handle by hand.

They purchased an INSLEY EXCAVATOR and are using it all over their properties for all sorts of small work, such as clearing up slides, maintaining road beds for industrial railways, rehandling clay, and loading it into box cars. It is exactly fitted for just such work, and handles anywhere from 150 to 400 cubic yards of material a day, as required.

This is only one of many examples of how the Insley Excavator is handling work at a profit which was previously done at a high cost, and is therefore making money for its owner. Write us for further information.



INSLEY

CONCRETE PLACING EQUIPMENT

STEEL DERRICKS

BUCKETS AND CARS

EXCAVATING EQUIPMENT



INSLEY MANUFACTURING CO.

Engineers and Manufacturers

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